



# **Massachusetts Health Care Cost Trends Part III: Health Spending Trends for Privately Insured 2006-2008**

**Technical Report**

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## Introduction

Nationally, spending for health care represents an increasing share of total economic activity, displacing production in other sectors of the economy. Estimated at less than 14 percent of Gross Domestic Product (GDP) in 1993, national health care spending is projected to reach 17.7 percent of GDP in 2010.<sup>1</sup>

Historically, per capita spending for privately insured health care services has grown faster than personal income, both nationally and in Massachusetts. Since 2006, this pattern has continued, despite stronger growth in personal income in Massachusetts than nationally. While Massachusetts residents' per capita personal income grew at an average rate of 4.1 percent per year from 2006 to 2008,<sup>2</sup> spending for privately insured health care services per member year grew 7.5 percent each year.

For privately insured residents of the Commonwealth, this growing cost burden manifests as rising payments for health insurance, as well as higher out-of-pocket costs as both covered employees and individuals who buy health insurance directly have accepted greater cost sharing to keep premiums affordable.

This report documents the major trends in total spending for care covered by fully-insured and self-insured comprehensive private health plans in Massachusetts from 2006 to 2008. Spending includes the amounts paid by insurers and self-insured employers, as well as cost sharing (such as co-payments and deductibles) paid by patients. Findings are based on claims data provided by six major health insurers in Massachusetts and represent roughly 65 percent privately insured Massachusetts residents. Carriers also reported payments to providers that did not flow through their claims systems—including capitation payments, withholds, and pay-for-performance bonuses; these amounts also are presented.<sup>3</sup> Spending estimates were adjusted actuarially to account for claims that were incurred but not yet reported, as well as for prescription drug spending that was “carved out” of comprehensive benefits and therefore not reported.<sup>4</sup> All estimates exclude spending under public coverage plans such as CommonwealthCare, Medicaid, and Medicare.

Throughout this report, spending is reported in total and per health plan member year. Total spending is the sum of all spending during the calendar year. Member years are calculated as average monthly enrollment during the calendar year.

## Section A:

# Background and Overview of Spending Change

In Massachusetts, total spending per member year grew 15.5 percent from 2006 to 2008, reflecting annual growth of 7.5 percent in both 2007 and 2008 (Figure A.1).<sup>5</sup> Relatively fast growth in spending for hospital outpatient care (13.7 percent in 2008), physician and other professional services (9.8 percent in 2008), and inpatient hospital care (7.9 percent in 2008) drove faster growth in total spending per member year than would otherwise have occurred.<sup>6</sup> In contrast, spending for prescription drugs grew 3.9 percent from 2006 to 2007, and 2.7 percent from 2007 to 2008.

In 2008, physician and other professional services and hospital outpatient services (the two largest categories of spending) together accounted for 57 percent of total spending for covered services (32 percent and 25 percent, respectively). Inpatient hospital care and prescription drugs together accounted for 35 percent of total spending (17 and 18 percent, respectively) (Figure A.2).

As noted above, the analysis in this report is based on private insurance claims, as reported by the six largest private health insurance carriers in Massachusetts. Two aspects of the underlying enrollment data for these estimates are worthy of mention. First, total enrollment among the reporting carriers held steady from 2006 to 2007, but then declined slightly in 2008—possibly reflecting the effects of growing economic recession, some redistribution of business toward smaller carriers, or both (Figure A.3). While the net loss in total enrollment was slight, there was a significant redistribution of insured lives toward self-insured plans and individual coverage. In 2008, the self-insured and individually insured sectors accounted for, respectively, 41.5 percent and 2.4 percent of all privately insured lives (in Figure A.3, measured as member years), compared with 38.9 percent and 1.6 percent in 2006.<sup>7</sup>

Second, enrollment in high-deductible health plans (defined here as plans with a deductible above \$1,000) grew substantially from 2006 to 2008. By 2008, enrollment in high-deductible plans represented about 11 percent of all enrolled lives (331,000 member years, Figure A.4), compared with less than 4 percent in 2006.<sup>8</sup> Consistent with greater enrollment in high-deductible plans, patient cost sharing increased as a percent of total spending from 2006 to 2008, particularly for individuals but also for small- and mid-sized groups (Figure A.5). However, in self-insured and large groups, cost sharing declined: in the aggregate, enrollees in those plans paid less as a percent of total spending in 2008 than in 2006.<sup>9</sup> Coupled with changes in enrollment, these changes in cost sharing probably drove much of the change in spending within insurance market sectors that we observe.<sup>10</sup>

## Major Findings

### Total Expenditures

- Spending per member year grew 15.5 percent from 2006 to 2008—rising 7.5 percent each year (Table A.1).

- Spending per member year for outpatient hospital care grew much faster than for services in any other major category, rising 12 percent in 2007 and 14 percent in 2008. Spending per member year for physician care grew 8 percent from 2006 to 2007 and 10 percent from 2007 to 2008. In contrast, spending for hospital inpatient care grew 9 percent from 2006 to 2007, but slowed to 8 percent from 2007 to 2008.

### **Outpatient Care**

- Spending per member year for hospital outpatient care grew 27 percent from 2006 to 2008, by 12 to 14 percent each year. At the same time, spending for outpatient care in freestanding facilities—already a small component of total outpatient spending—declined (Table A.1). Overall, including care in both hospital outpatient departments and in freestanding outpatient facilities, outpatient spending per member year grew nearly 23 percent from 2006 to 2008.
- Hospital outpatient care accounted for 37 percent of the growth in total spending from 2006 to 2008 (Figure A.6). Including payments for inpatient and outpatient care, hospital services accounted for more than half of the growth in total spending (56 percent) from 2006 to 2008.

### **Physician and Other Professional Services**

- Total spending for physician and other professional services also grew rapidly, by 8 percent in 2007 and 10 percent in 2008 (Table A.1). Physician and other professional services accounted for 39 percent of the growth in total spending from 2006 to 2008 (Figure A.6).
- Increased payments to specialists accounted for about half of the growth in total spending for physician and other professional services in both 2007 and 2008, while payments to primary care providers accounted for about a third (see Section D).

### **Inpatient Care**

- Total spending for inpatient care grew 7 percent from 2007 to 2008, slowing from 9 percent growth the year before (see Section B). Cumulatively, from 2006 to 2008, spending for hospital inpatient care grew nearly 17 percent.
- Surgical DRGs are the largest component of inpatient care and accounted for about half of the growth in total spending each year. Total spending for surgical DRGs grew \$85.8 million from 2006 to 2007, and another \$81.6 million from 2007 to 2008. Total spending for inpatient maternity care (for both mothers and newborns) grew just \$13.4 million from 2007 to 2008, much less than from 2006 to 2007.
- Spending per member year for inpatient care grew 18 percent from 2006 to 2008. In 2008, average spending for inpatient care among enrollees in individual coverage (\$986 per member year) was greater than the average in small groups (\$666), medium-sized groups (\$699), large groups (\$787), or self-insured plans (\$828). However, with greater enrollment in the individual market, inpatient spending per member year fell 5 percent from 2007 to

2008—narrowing the gap in spending per member year among insurance market sectors. In contrast, inpatient spending per member year in self-insured plans grew 10 percent from 2007 to 2008, slightly faster than from 2006 to 2007.

- Most of the growth in average spending for inpatient care from 2006 to 2008 was associated with increased spending per inpatient day. Spending per inpatient day grew nearly 9 percent from 2006 to 2007 and more than 7 percent from 2007 to 2008, while both the rate of admissions (per member year) and the average length of stay grew modestly, if at all.

### Insurance Market Sectors

- Spending per member year among individually insured residents grew just 2 percent from 2006 to 2008—including 4-percent growth from 2006 to 2007, followed by a 2-percent drop from 2007 to 2008 (Table A.2). Lower spending per member month in 2008 apparently reflected new enrollment by individuals with lower health care needs in 2008, the purchase of individual plans with greater cost sharing, or both. However, despite relatively low growth, spending per member year among individuals remained much higher than among insured or self-insured groups—at least in part, reflecting the older average age of enrollees with individual coverage.<sup>11</sup>
- In self-insured plans, greater enrollment and lower out-of-pocket cost as a percent of total spending coincided with growth in average spending (per member year). In 2008, spending per member year in self-insured groups grew nearly 9 percent, faster than among fully insured groups. In the fully insured market, spending per member year grew 7 percent in small groups, 6 percent in medium-sized groups, and nearly 8 percent in large groups. Self-insured plans accounted for 62 percent of the growth in total spending from 2006 to 2008, and 70 percent of the growth in total spending from 2007 to 2008.

### Teaching and Nonteaching Hospitals

- Teaching hospitals accounted for 64 percent of total spending for inpatient care in 2008, and 65 percent of the growth in total inpatient spending from 2006 to 2008, reflecting both increases in spending per patient day and admissions per member year (see Section B). Teaching hospitals outside the Boston metro area saw the fastest growth in both spending per patient day (22 percent, unadjusted for case mix) and days per admission rose (5 percent) from 2006 to 2008.
- Spending per patient day (unadjusted for case mix) rose much faster in nonteaching hospitals (22 percent) than in teaching hospitals (16 percent) from 2006 to 2008, reflecting slower growth in spending per inpatient day in Boston metro area teaching hospitals in particular (16 percent). For nonteaching hospitals, patient spending per member year rose somewhat more slowly than for teaching hospitals due only to declining admissions per member year (specifically in nonteaching hospitals outside the Boston metro area) and declining days per admission.

### Imaging Services

- Imaging services accounted for 24 percent of total spending for outpatient services in 2008, but 28 percent of the growth in total outpatient spending from 2006 to 2008 (see Section C). Spending for the facility component of imaging services grew twice as fast as spending for the professional services component (see Section E).

### Drivers of Expenditure Change

- Higher prices accounted for much of the growth in spending for inpatient and outpatient care as well as for professional services from 2006 to 2007 (Table A.2). Changes in service mix favored the delivery of less costly hospital outpatient services as well as less costly physician and professional services—offsetting some of the expenditure growth that would otherwise have occurred due to increases in prices as well as greater volume of services.
- Higher prices accounted for about half of the growth in spending for imaging services from 2006 to 2007, reinforced by greater volume of imaging services. Spending for digital mammography grew especially fast: digital screening mammography and digital diagnostic mammography together accounted for 27 percent of the growth in spending for imaging services from 2006 to 2008 (see Section E).

### Price Variation

- The prices that carriers pay for any selected service typically vary across carriers and providers (see Sections B through E). In 2008, the prices paid for services that accounted for (either or both) high total expenditure or high expenditure growth varied by orders of magnitude, with price differentials typically equating to hundreds of dollars for the same service. The variation in dollar amounts was typically much greater for facility charges than for professional charges.

### System Efficiency: Hospital Readmissions

- About 7 percent of medical and surgical hospitalizations in 2007 resulted in at least one readmission (see Section F). Both the number of readmissions and spending (per member year) for readmissions were higher for medical DRGs than surgical DRGs, and higher in teaching than in non-teaching hospitals.
- Patients who were readmitted within 30 days were less likely to have seen a physician following discharge than patients who were not readmitted. Among all medical and surgical DRGs, 66 percent of patients who were readmitted in 2007 saw a physician following discharge, compared with 73 percent of patients who were not readmitted.



## **Section B:**

# **Spending for Hospital Inpatient Care**

Key findings with respect to the change in spending for hospital inpatient care from 2006 to 2008 are reported below. As indicated earlier, throughout this report, spending includes private insurer and self-insured employer plan payments, as well as patient cost sharing. In this section, we report only payments related to facility charges for acute inpatient care—that is, payments to institutional providers, but not to physicians or for other professional services provided during an inpatient stay when those services were billed separately. When billed separately, payments for inpatient physician and other professional services are reported in Section D.

### **1. Inpatient Spending by Insurance Market Sector and Service Type**

Insured plans—including insured large and medium-sized groups as well as small groups and individuals—accounted for more than half (55 percent) of all spending for inpatient care in 2008. Self-insured group plans accounted for the rest.

Carriers use diagnosis-related groups (DRGs) to classify hospital admissions. Across all insurance market sectors, about half of all spending for inpatient care in 2008 was for surgical DRGs (53 percent). Medical diagnoses and maternity accounted for 31 percent and 15 percent of inpatient spending, respectively.

- Residents in insured health plans accounted for 55 percent of all spending for inpatient care in 2008, while those in self-insured employer plans accounted for 45 percent (Figure B.1). Insured small-group and individual plans together accounted 21 percent of total inpatient spending in 2008; large- and medium-sized insured group plans accounted for 34 percent.
- In 2008, surgical DRGs accounted for more than half of total spending for inpatient care (53 percent or \$1.18 billion, Figure B.2). Medical DRGs accounted for 31 percent (\$695 million), while maternity DRGs accounted for 15 percent (\$334 million).

### **2. Change in Inpatient Spending**

Growth in spending for inpatient care per member year slowed in 2008, reflecting slower growth in inpatient spending per member year in small- and medium-sized commercially insured groups and lower inpatient spending per member year in large insured groups.

- Total expenditures for inpatient care grew 9 percent from 2006 to 2007, and 7 percent from 2007 to 2008 (Figure B.3). Cumulatively, from 2006 to 2008, spending for hospital inpatient care grew nearly 17 percent.
- From 2006 to 2008, spending for inpatient care grew \$323.2 million (Figure B.4). Self-insured plans accounted for nearly two-thirds of this growth (\$205.6 million, or 63 percent). Coinciding with higher enrollment in self-insured plans in 2008, self-insured spending



accounted for more than 80 percent of the growth in total inpatient spending from 2007 to 2008.

- Spending for individually insured inpatient care grew \$21.6 million from 2006 to 2008, accounting for 7 percent of the growth in total inpatient spending over that period. Most of this growth coincided with implementation of Massachusetts' coverage reforms in 2008 and greater enrollment in individual plans.
- Commercially insured groups plans accounted for 30 percent of the growth in inpatient spending from 2006 to 2008. Medium-sized and small insured groups respectively accounted for 11 percent and 16 percent of the growth in total spending, while insured large groups accounted for just 3 percent. The very low growth in large-group spending for inpatient care from 2006 to 2008 reflects modest inpatient spending growth from 2006 to 2007 (14 percent of total inpatient spending growth) and a decline in spending for inpatient care from 2007 to 2008 (Figure B.4a).
- Surgical DRGs are the largest component of spending for inpatient care and accounted for about half of the growth in total inpatient spending in both 2007 and 2008—\$85.8 and \$81.6 million, respectively (Figure B.5).
- In 2008, spending for inpatient maternity care grew just \$13.4 million, much less than in 2007.

### 3. Average Inpatient Spending

Average spending (per member month) for inpatient care was greater for residents with individual coverage than for residents in either insured or self-insured group plans, but the gap has narrowed. In both 2007 and 2008, average inpatient spending declined among residents with individual coverage, but increased for residents in insured or self-insured group plans. As a result, average inpatient spending was more similar among insurance market sectors in 2008 than in 2006.

- Average spending for inpatient care was \$766 (per member year) in 2008, 18 percent higher than in 2006 (Table B.1). In 2008, average spending for inpatient care among enrollees in individual coverage was \$986, greater than the average in small groups (\$666), medium-sized groups (\$699), large groups (\$787), or self-insured plans (\$828).
- Fully insured groups and individuals saw slower growth in average inpatient spending from 2007 to 2008 than from 2006 to 2007. In the individual market, inpatient spending per member year fell 5 percent in 2008—as younger (and apparently healthier) adults enrolled in individual coverage.<sup>12</sup> In contrast, inpatient spending per member year in self-insured plans increased 10 percent from 2007 to 2008, slightly faster than from 2006 to 2007.

## 4. Components of Growth in Average Inpatient Spending

The relatively slow growth of spending for maternity care in self-insured and insured group coverage largely drove the slower growth in average inpatient spending overall from 2007 to 2008. Only in individual plans did spending for maternity care increase faster from 2007 to 2008 than from 2006 to 2007.<sup>13</sup> Aggregated across market sectors, slower growth in spending for maternity care reflected slightly fewer maternity admissions per member year as well as slower growth in spending per admission. In contrast, inpatient spending per member year for medical and surgical services grew at about the same annual rate from 2006 to 2007 and from 2007 to 2008.

- Average spending for inpatient care grew 9 to 10 percent from 2006 to 2007 for medical, surgical, and maternity inpatient stays alike (Table B.2). However, from 2007 to 2008, spending for inpatient maternity care slowed markedly. While average spending for medical and surgical stays continued to grow 9 percent and 8 percent, respectively, average spending for maternity care increased less than 5 percent—about half as fast as from 2006 to 2007.
- In both years, most of the growth in average spending for inpatient care was associated with increased spending per inpatient day. Spending per inpatient day increased nearly 9 percent from 2006 to 2007 and more than 7 percent from 2007 to 2008, while both the rate of admissions (per member year) and the average length of stay grew modestly, if at all (Table B.2).
- Both the rate of admissions (per member year) and average length of stay declined markedly among residents with individual coverage, coinciding with significant enrollment growth in that sector (Table B.3). From 2007 to 2008, average inpatient spending declined 5 percent among residents with individual coverage, reflecting 9 percent fewer admissions per member year and nearly 2 percent fewer days per admission. Spending per inpatient day increased 6 percent among residents with individual coverage—about the same as for large insured groups.
- Self-insured plans experienced the fastest growth in inpatient spending per member year (10 percent) from 2007 to 2008, compared with insured small groups (6 percent), medium-sized groups (5 percent) or large groups (6 percent). The faster growth in self-insured plan spending per member year was associated with high growth in spending per inpatient day (9 percent, comparable to small insured groups), as well as growth in the number of admissions per member year. In contrast, admissions per member year fell in each of the insured sectors.

## 5. Differences in Inpatient Spending by Hospital Teaching Status and Service Area

Teaching hospitals Massachusetts accounted for 64 percent total spending for inpatient care in 2008, and 65 percent of the growth in total inpatient spending from 2006 to 2008. In general, the highest spending per admission and the longest lengths of stay were associated with teaching hospitals.

From 2006 to 2008, the number of admissions per member year to either teaching hospitals or Boston-area nonteaching hospitals grew, nonteaching hospitals outside the Boston area saw declining admissions. Overall, there was a small increase in the proportion of patients who, when hospitalized, were admitted to teaching hospitals instead of nonteaching hospitals.

- In 2008, teaching or tertiary care hospitals accounted for 64 percent of spending for inpatient care—including 70 percent of spending for surgical DRGs, 56 percent of spending for medical DRGs, and 59 percent of spending for maternity DRGs (Figure B.6).<sup>14</sup>
- Reflecting the regional concentration of teaching and nonteaching hospitals in Massachusetts, Boston-area hospitals accounted for nearly 70 percent of total spending for inpatient hospital care in 2008. Teaching hospitals accounted for about three fourths of total inpatient spending in the Boston area.
- Spending for inpatient care Massachusetts grew \$323.2 million from 2006 to 2008 (Figure B.7). Teaching hospitals in the Boston metro area accounted for more than half of this growth (\$156.8 million, or 51 percent), while teaching hospitals in other areas of the state accounted for 14 percent (\$44.1 million).
- From 2007 to 2008, spending for inpatient care in non-Boston teaching hospitals grew 14 percent, accounting for 22 percent of the total growth in inpatient expenditures, and substantially exceeding for the growth of spending for either teaching hospitals (7 percent) or non-teaching hospitals (9 percent) in the Boston area (Figures B.7a and B.8). Total spending for inpatient care in nonteaching hospitals outside the Boston area grew less than 4 percent.
- Admissions per member year to Boston-area teaching and nonteaching hospitals grew about 2 percent from 2006 to 2008—with somewhat faster growth in admissions to Boston-area teaching hospitals—while admissions to hospitals outside the Boston metro area declined (Figure B.9) From 2007 to 2008, admissions per member year to teaching hospitals outside the Boston area grew nearly 2 percent—about the same rate of growth as for Boston-area teaching hospitals, while admissions to nonteaching hospitals outside the Boston area continued to decline (-3 percent). In 2008, teaching hospitals in Massachusetts accounted for nearly 49 percent of admissions, compared with about 47 percent in 2006 (data not shown).
- In 2008, the average cost per inpatient admission to Boston-area teaching hospitals exceeded \$15,000. Unadjusted for case mix, this was 81 percent more than the cost per admission to nonteaching hospitals in the Boston area and 21 percent more than the average cost per admission to non-Boston teaching hospitals (Table B.4). This higher cost per admission largely reflected higher spending per inpatient day in Boston-area teaching hospitals compared with teaching hospitals in other areas of the state. Teaching hospitals, whether in or outside the Boston area, had both longer stays per admission and higher spending per inpatient day (unadjusted for case mix) than nonteaching hospitals.
- Boston-area teaching hospitals saw slower growth in spending per day (unadjusted for case mix) from 2007 to 2008 (6 percent), than from 2006 to 2007 (9 percent). In addition, the average length of stay in Boston-area teaching hospitals continued to decline, although less

than in 2007. Both factors slowed the growth of spending per admission for inpatient care in these hospitals from 8 percent from 2006 to 2007, to about 6 percent from 2007 to 2008.

- In contrast, teaching hospitals outside the Boston metro area saw sustained growth in both spending per day and days per admission. From 2006 to 2008, spending per day in these hospitals grew nearly 17 percent (7 to 9 percent per year), while the number of days per admission grew 5 percent (1 to 4 percent per year). As a result, total spending per admission to teaching hospitals outside the Boston metro area grew 22 percent from 2006 to 2008, compared with 14-percent for Boston area teaching hospitals.
- Spending per patient day (unadjusted for case mix) rose much faster in nonteaching hospitals (22 percent) than in teaching hospitals (16 percent) from 2006 to 2008, reflecting slower growth in spending per inpatient day in Boston metro area teaching hospitals in particular (16 percent). For nonteaching hospitals, patient spending per member year rose somewhat more slowly than for teaching hospitals due only to declining admissions per member year (-3 percent overall, and -7 percent per member year specifically in nonteaching hospitals outside the Boston metro area) and declining days per admission (-1 percent overall).

## 6. High-Cost Inpatient Services

Privately insured patients are admitted to hospitals for many reasons, and no single DRG accounts for a very large share of spending. Taken together, the five DRGs for which total inpatient spending were the greatest accounted for just 9 percent of spending for inpatient care in teaching hospitals in 2008, and 17 percent of spending for inpatient care in non-teaching hospitals (data not shown).

- In 2008, maternity admissions—including both normal deliveries and Cesarean sections—were among the largest sources of spending for inpatient care, accounting for \$51.9 million of spending for inpatient care in teaching hospitals and \$58.7 million of spending in nonteaching hospitals (Figure B.10). Among other DRGs that accounted for significant total spending in teaching hospitals was care on a ventilator for 4 days or longer (\$36.8 million). In nonteaching hospitals, lower joint or limb reattachment, such as knee replacement (\$33.6 million) was among other DRGs that accounted for significant total spending.
- Care on a ventilator and lower joint or limb reattachment were also among the DRGs that accounted for the greatest spending growth from 2007 to 2008 (Figure B.11). In teaching hospitals, other DRGs driving high growth in inpatient spending included cardiac and vascular procedures, as well as autologous bone marrow transplant. In nonteaching hospitals, the increase in spending for inpatient gastric procedures due to obesity (nearly \$5 million) exceeded that for any other single DRG from 2007 to 2008, followed closely by increased spending for lower joint or limb reattachment (such as knee replacement).

## 7. Drivers of Inpatient Spending Growth: Price, Volume, and Intensity

This section provides estimates of the drivers of change in spending 2007, parsing the change in total spending into its component parts: change due to price, change due to volume (the number of admissions), and change due to service mix (hospitalizations for more expensive conditions). To identify what drove the increase in spending per hospital day, we constructed a market basket that included types of hospitalizations (by DRG) that occurred consistently in 2006 and 2007. Estimates for 2008 are not presented, as the absence of some 2008 claims (those incurred but not yet reported) may make comparison with 2007 at this level of detail misleading.

From 2006 to 2007, price increases were the dominant driver of growth in spending for this market basket of inpatient services, for both teaching and nonteaching hospitals. In turn, changes in price may result from any of several potential occurrences, alone or in combination: (1) hospitals may change their prices per DRG; (2) patients may change their use of specific hospitals, which are paid differently for the same DRG; and (3) patients may change health plans, which pay different hospitals different rates for the same DRG. The measure of price developed for this analysis does not parse these potential sources of price change.

- Higher prices explained nearly all of the growth in spending for market-basket inpatient care from 2006 to 2007, offset in part by a shift in service mix to lower-cost DRGs at teaching hospitals and lower admissions to non-teaching hospitals (Table B.5).
- Had the rate of admissions and service mix remained the same as in 2006, price increases from 2006 to 2007 would have driven total expenditure growth of 9 percent (in teaching hospitals) and 10 percent (in nonteaching hospitals) for services in the inpatient market basket, versus the 8.5 percent growth that occurred in teaching and nonteaching hospitals alike.

## 8. Variation in Prices for Inpatient Services

The price that carriers pay for a DRG varies across carriers and, for each carrier, across hospitals. Overall, price variation can be substantial. For example:

- In 2008, the highest price that carriers paid per admission for a gastric procedure for obesity performed in a teaching hospital was more than seven times the lowest price (Figure B.12). In nonteaching hospitals, the average price for the same procedure was lower (about \$12,000, versus more than \$14,000 in a teaching hospital), but the variation in prices was similar.
- For other high-frequency DRGs, the highest price paid generally exceeded the lowest price by a factor of 2 or more.

## **Section C:**

### **Spending for Outpatient Services**

Key findings about spending for outpatient services provided by hospitals and other freestanding facilities<sup>15</sup> are reported below. The spending levels and trends reported in this section represent only facility charges; when billed separately, spending for professional services associated with a hospital or clinic outpatient visit are reported in Section D.

#### **1. Level of Outpatient Spending: Provider and Service Types**

In Massachusetts, acute care hospitals (versus freestanding facilities) provide most outpatient care. Imaging accounts for nearly one fourth of total spending for outpatient services.

- Procedures and imaging services together accounted for more than half of all spending for outpatient care—respectively, 31 percent and 24 percent in 2008 (Table C.1).
- Hospitals provided 92 percent of all outpatient care in 2008, totaling \$3.1 billion. Freestanding facilities provided the remainder (\$255 million).
- Procedures accounted for 31 percent of total spending for hospital outpatient care in 2008, but 73 percent of total spending for services from freestanding outpatient facilities.<sup>16</sup>
- Hospitals provided nearly all imaging services in 2008. Imaging services accounted for 25 percent of spending for outpatient care obtained in hospitals (\$773 million) in 2008, but just 4 percent of spending for care provided in freestanding facilities (\$9 million).

#### **2. Change in Outpatient Spending**

From 2006 to 2008, spending for outpatient care consistently grew faster than spending for inpatient care. Outpatient hospital care accounted for all of this growth, as spending for care in freestanding facilities declined.

- Outpatient spending increased 10 to 11 percent each year, from \$2.7 billion in 2006 to \$3.3 billion in 2008 (Table C.2). Declining spending for care in freestanding facilities (-\$42 million) only partially offset the growth in spending for outpatient hospital care (\$637 million).
- Outpatient spending accelerated from 2007 to 2008, growing 11 percent compared with less than 10 percent from 2006 to 2007. Faster growth in hospital outpatient spending accounted for all of this increase. Spending for hospital outpatient care grew 13 percent from 2007 to 2008, while spending for care at freestanding facilities declined more than 7 percent (about the same rate of decline as in 2007).
- Spending for both procedures and imaging services grew disproportionately fast from 2006 to 2008, so that by 2008 they represented a greater proportion of outpatient spending than



in 2006 (data not shown). Nearly 34 percent of the growth in private insurance spending for outpatient care from 2006 to 2008 was due to greater spending for procedures, while imaging services accounted for 28 percent (Table C.3). Evaluation and management accounted for 11 percent of the growth in outpatient services.

### 3. Average Outpatient Spending

In each year, spending for outpatient care per member year was greater for residents with individual coverage than for residents in either insured or self-insured group plans. However, this difference narrowed from 2006 to 2008.

- On average, Massachusetts residents spent \$1,128 per member year for outpatient services in 2008 (Table C.4). Residents in fully-insured groups spent somewhat less than the average (ranging from \$1,080 for small groups to \$1,124 for large groups), while those in self-insured plans spent more (\$1,185). However, as with inpatient care, residents with individual coverage averaged much higher spending for outpatient care (\$1,428 per member year) than those with group coverage.
- From 2006 to 2007, average outpatient spending increased substantially and at about the same rate in all insurance market sectors. Outpatient spending per member year grew about 9 percent in small groups and self-insured plans, 10 percent for individuals, and nearly 11 percent for medium-sized and large insured groups.
- Average spending (per member year) for outpatient care accelerated from 2007 to 2008, growing 11 to 12 percent in every insurance market sector except in the individual sector. In the individual sector, outpatient spending per member year was approximately stable as enrollment grew nearly 50 percent. As a result, individuals spent 42 percent more per member year for outpatient services than the statewide average in 2006, but just 27 percent more by 2008.

### 4. Components of Growth in Average Outpatient Spending

Growth in outpatient spending per member year was comprised of growth in both average spending per service and the number of services used per member. Changes in average spending per service may reflect changes in the prices paid for any given service, changes in the mix of services, or both.

Growth in both average spending per service and the number of services used per member contributed to growth in spending per member year for outpatient care from 2006 to 2008, overall and in particular as provided by hospitals. In freestanding facilities, the volume of outpatient care declined while average spending per service increased sharply.

- From 2006 to 2008, growth in average spending per outpatient service and growth in the use of services per member contributed about equally to growth in spending per member year for outpatient care, aggregated across hospitals and freestanding facilities (Table C.5).



- Because hospitals deliver most outpatient care in Massachusetts, changes in spending for hospital outpatient care largely drive changes in average spending for outpatient services overall. Average spending per hospital outpatient service grew about 7 percent from 2006 to 2007, slowing to 5 percent from 2007 to 2008. At the same time, growth in the number of hospital outpatient services per member month accelerated sharply—rising 4 percent from 2006 to 2007, and 8 percent from 2007 to 2008.
- The number of outpatient services per member year obtained in freestanding facilities declined nearly 22 percent from 2006 to 2008, while the average expenditure per service grew 8 percent. Because outpatient care provided at freestanding facilities accounts for only a small part of all outpatient spending, these changes had little impact on the overall growth in outpatient spending.
- From 2006 to 2008, spending per service grew faster for evaluation and management services (9 percent) than for any other outpatient service category—including imaging (7 percent), procedures (4 percent), and all other services (3 percent) (Figure C.1). However, the number of evaluation and management services delivered per member year grew very little (about 1 percent) from 2006 to 2008, compared with 5 to 8 percent growth for other outpatient services.

## **5. Differences in Outpatient Spending by Hospital Teaching Status and Service Area**

Teaching hospitals in Massachusetts account for more than half of all spending for outpatient care. Boston-area teaching hospitals account for a large share of this spending, and for most of the growth in outpatient spending from 2006 to 2008.

- In 2008, teaching hospitals provided more than half (54 percent) of hospital outpatient care (Figure C.2). Most spending for hospital outpatient care (45 percent of total outpatient spending) was for care obtained in Boston-area teaching hospitals.
- In 2008, teaching hospitals accounted about half of all spending for evaluation and management services and procedures (54 percent), 47 percent of spending for imaging services, and a 59 percent of spending for other outpatient services. In contrast, nonteaching hospitals accounted for a relatively large share of spending for imaging services (53 percent, compared with 46 percent of hospital outpatient services overall) and a relatively small share of spending for other outpatient services (41 percent).
- Spending for hospital outpatient care grew \$637 million from 2006 to 2008 (Figure C.3). Boston-area teaching hospitals accounted for more than half of this growth (55 percent).
- Spending for outpatient care in Boston-area nonteaching hospitals accelerated from 2007 to 2008. As a result, those hospitals accounted for a substantially larger share of the growth in total spending for outpatient hospital care (16 percent) from 2007 to 2008, than from 2006 to 2007 (11 percent) (Figure C.3a).

- In 2008, average spending per outpatient service (unadjusted for case mix) was highest in Boston-area teaching hospitals (\$156, compared with \$106 for nonteaching hospitals in the Boston area, and \$111 for other teaching hospitals in Massachusetts) (Table C.6).
- In the Boston area, average spending per outpatient service obtained in teaching hospitals grew nearly 21 percent from 2006 to 2008—more than twice as fast as for care obtained in nonteaching hospitals (9 percent). When combined with 13 percent growth in the number of services provided, average spending for outpatient care in Boston-area teaching hospitals grew 36 percent from 2006 to 2008. Average outpatient spending in nonteaching hospitals in the Boston area grew 22 percent.
- From 2006 to 2008, average spending (per member year) for hospital outpatient care outside the Boston area grew 20 to 21 percent—about equal to the growth in spending for care in Boston area nonteaching hospitals (22 percent). While average spending per service in non-Boston hospitals grew relatively slowly (6 to 7 percent) from 2006 to 2008, the number of services delivered per member year grew 12 to 14 percent—faster than in Boston-area hospitals, whether teaching (13 percent) or nonteaching (11 percent).
- Average outpatient spending (per member year) in teaching hospitals outside the Boston area grew much faster from 2007 to 2008 (12 percent) than from 2006 to 2007 (8 percent). The faster growth of average spending in teaching hospitals compared with nonteaching hospitals outside the Boston area reflected faster growth in average spending per service.

## 6. High-Cost Outpatient Services

Although no single service accounted for a large proportion of the total growth in spending for outpatient services in any year, in several service categories spending increased very fast:

- Digital mammography imaging services accounted for \$14.8 million of the growth in outpatient hospital services in 2008 (Figure C.4). The next largest sources of growth in spending for outpatient services were injections of either of two cancer-treating drugs—bevacizumab (Avastin) and trastuzumab (Herceptin)—together accounting for \$11.7 million of the increase in total spending for outpatient services in 2008.
- Diagnostic procedures—including colonoscopy and upper-GI endoscopy—contributed significantly to growth in total outpatient spending in freestanding clinics in 2008. Cataract removal and evaluation and management services also were among the largest sources of growth in expenditure for outpatient care obtained in freestanding clinics.

## 7. Drivers of Total Outpatient Spending Growth: Price, Volume, and Intensity

Similar to the analysis of inpatient spending growth in Section B, we produced a market basket of the outpatient services that were delivered in 2006 and 2007 in order to measure the separate impacts of changes in price, volume, and service mix on the growth in spending for outpatient care. As with our analysis of inpatient spending, changes in price may result from any or all of three

potential changes: (1) providers may change the price of any given service; (2) patients may change their use of providers, who may be paid a different price for the same service; and (3) patients may change health plans, which may pay different providers different prices for the same service.

- Both higher prices and greater volume of services drove outpatient spending growth from 2006 to 2007, while service mix gravitated to lower-cost services (Table C.7).
- Because the additional volume was comprised of services that on average were less expensive, the net impact on spending was less than it otherwise would have been. The combined impact of greater volume and less costly service mix contributed 5 percentage points to the 12 percent growth in total outpatient spending that actually occurred. In contrast, had volume and service mix remained unchanged from 2006 to 2007, higher prices alone would have driven a 7-percent increase in total spending for outpatient care from 2006 to 2007.

## **8. Variation in Prices for Outpatient Services**

As with inpatient services, the prices that carriers pay for outpatient services vary across carriers and, for each carrier, across providers. The resulting price variation can be substantial. For example:

- For surgical arthroscopy of the shoulder obtained in a hospital, the highest price paid in 2008 was 19 times the lowest price paid (\$6,303 versus \$334) (Figure C.5). Prices paid for a cholecystectomy (gallbladder removal) varied nearly 18 to 1 (\$6,686 versus \$379). For these services obtained in freestanding clinics, the variation in prices was similarly high.

## Section D:

# Spending for Physician and Other Professional Services

Key findings with respect to the change in spending for physician and other professional services from 2006 to 2008 are reported below. Physicians and other professionals include medical specialists, primary care physicians, and other medical professionals.<sup>17</sup> Note that the estimates exclude payments for facility charges if billed separately; these expenses are reported in Sections B and Section C.

### 1. Level of Spending for Professional Services: Insurance Market Sectors and Service Types

In 2008, more than half of all spending for physician and other professional services were for care provided by medical specialists.

- In 2008, 54 percent of total spending for physician and other professional services was for specialty care; 31 percent was for primary care (Figure D.1).
- Insured health plans—including both individuals and insured groups—accounted for more than half (56 percent) of total spending for physician and other professional services in 2008 (Figure D.2). Small group and individual health plans together accounted for about 22 percent, while insured large and medium-sized group plans accounted for 15 percent and 19 percent, respectively. Self-insured plans accounted for 44 percent of total spending for physician and other professional services.

### 2. Change in Spending for Physician and Other Professional Services

Total spending for professional services grew 18 percent from 2006 to 2008. Payments for specialty care accounted for about half of the increase in spending for professional services each year.

- Total spending for physician and other professional services grew 8 percent from 2006 to 2007, and 9 percent from 2007 to 2008 (Figure D.3). Cumulatively, total spending for these services grew 18 percent from 2006 to 2008.
- Higher payments to specialists accounted for about half of the growth in total spending for physician and other professional services from 2006 to 2007 (50 percent) and also from 2007 to 2008 (48 percent) (Figures D.4 and D4a).
- Primary care providers accounted for about one third (31 percent) of the overall growth in expenditures for physician and other professional services from 2006 to 2008. However, primary care providers received a smaller share of the growth in total spending for physician and other professional services from 2007 to 2008 (28 percent) than from 2006 to 2007 (37 percent). Moreover, the increase in total spending for primary care from 2007 to 2008

(\$100.7 million) was, in dollar terms, less than the increase from 2006 to 2007 (\$113.3 million).

- In contrast, other (non-physician) medical professionals accounted for 13 percent of the growth in spending for professional services from 2006 to 2007 (\$40.0 million), and nearly 25 percent of the growth in spending from 2007 to 2008 (\$89.4 million).

### **3. Average Spending for Physician and Other Professional Services**

Similar to their higher cost for inpatient and outpatient services, individually insured residents incurred higher average (per member year) spending for physician and other professional services, compared with residents in either insured or self-insured groups. However, average spending for individually insured residents grew much more slowly than for group-insured residents from 2007 to 2008, substantially reducing the difference in average spending in 2008 among market sectors.

- From 2006 to 2008, residents with individual coverage spent more per member year for professional services than residents in either insured or self-insured groups (Table D.1). In 2008, individually insured residents spent \$1,716 per member year for professional services, compared with \$1,397 in small groups and \$1,368 in medium-sized groups. Among residents in group coverage, average spending for physician and other professional services was greatest in insured large groups (\$1,474) and in self-insured plans (\$1,554).
- Average spending for physician and other professional services (per member year) grew 19 percent from 2006 to 2008. Insured large groups and self-insured plans posted the fastest growth in average spending for professional services—about 20 percent from 2006 to 2008. Average spending in small and medium-sized insured groups grew more slowly, about 17 percent.
- Compared with insured and self-insured groups, insured individuals saw relatively little spending growth for physician and other professional services from 2006 to 2008—less than 10 percent. For insured individuals, average spending for these services grew much more slowly from 2007 to 2008 (3 percent) than from 2006 to 2007 (6 percent), as enrollment in individual coverage grew. As a result of this much slower growth in spending, the difference in average spending for physician and other professional services between residents with individual coverage and those in small groups narrowed: while individuals spent, on average, 31 percent more for physician and other professional services than small groups per member year in 2006, by 2008 they spent 23 percent more.

### **4. Components of Growth in Average Spending for Physician and Other Professional Services**

From 2006 to 2008, spending per member year for other (non-physician) professional services grew much faster than spending for either specialty or primary care, reflecting faster growth in both

average spending per service (unadjusted for case mix) and the number of services provided per member year.

- Average spending (per member year) for primary care grew nearly 20 percent from 2006 to 2008 (Table D.2). From 2007 to 2008, somewhat slower growth in average spending for primary care (9 percent, compared with 10 percent the year before) reflected slower growth in both spending per service and the number of services provided per member year.
- In contrast, average spending for other (non-physician) professional services grew nearly 26 percent from 2006 to 2008, fueled by 12-percent growth in both average spending per service and the number of services provided. Average spending for other professional services accelerated from 2007 to 2008, growing nearly 17 percent (compared with 8 percent growth from 2006 to 2007). Both spending per service and the number of services provided per member year grew faster from 2007 to 2008 than in the prior year.
- Average spending for specialty care grew 17 percent from 2006 to 2008—reflecting 4 to 5 percent growth in spending per service each year, and 2 to 4 percent annual growth in the number of services provided per member year.
- From 2006 to 2008, both self-insured groups and insured large groups saw a 20-percent increase in average spending for physician and other professional services, compared with a 17-percent increase for insured small and medium-sized groups (Table D.3). While average spending per service grew at about the same rate for all group plans, whether insured or self-insured (9 percent from 2006 to 2008), the number of services provided per member year grew much faster in insured large groups and self-insured plans (10 percent) than in small and medium-sized groups (6 to 7 percent).
- Among individuals enrolled in non-group coverage, average spending for physician and other professional services grew less than 10 percent from 2006 to 2008. Average spending per service grew more slowly (8 percent) than for insured or self-insured groups (9 to 10 percent), while the number of services provided per member year grew just 1 percent—reflecting 3-percent growth from 2006 to 2007, and a 2- percent decline in the number of services per member year from 2007 to 2008.

## **5. High-Cost Physician and Other Professional Services**

Evaluation and management (E&M) services and individual psychotherapy are major components of spending for physician and other professional services, and they account for substantial expenditure growth.

- In 2008, spending for the seven highest-expenditure E&M services totaled \$934.9 million (Figure D.5). Individual psychotherapy, routine obstetric care (vaginal delivery), and surgical pathology (gross and microscopic examination) also represented high total spending for professional services in 2008.



- In 2008, spending for E&M services for low or moderately complex patients, followed by spending for individual psychotherapy, grew more than spending for any other major professional service category (Figure D.6). Together, E&M services for low or moderately complex patients grew \$71.3 million, while other major categories of E&M services—including office consultations, ER visits, and preventive services—grew \$18.7 million. Spending for individual psychotherapy grew \$32.0 million.

## 6. Drivers of Growth in Spending for Physician and Other Professional Services: Price, Volume, and Intensity

Similar to the analysis of drivers of spending growth for inpatient and outpatient services in earlier sections, we developed a market basket of physician and other professional services provided in 2006 and 2007 to explore drivers of change. In effect, higher prices drove all of the increase in spending for these services from 2006 to 2007. While the volume of services also increased, service mix migrated toward less costly services, fully offsetting the cost impact of higher volume.

- Higher prices were the major driver of higher expenditures for professional services in 2007. Had prices remained at 2006 levels, the combined change in volume and service mix would have reduced total spending for professional services in the market basket (compared with actual spending growth of about 8 percent) (Table D.4).

## 7. Variation in Prices for Physician and Other Professional Services

Prices for physician and other professional services vary across carriers and providers, resulting in wide disparities in prices for the same service. For example:

- In 2008, the highest price for an E&M visit for a moderately complex patient was 3 times the lowest price paid (\$220 versus \$64) (Figure D.7). Insurer payments for other services such as individual psychotherapy visits and E&M visits for low-complexity patients also varied widely.



## **Section E:**

### **Spending for Imaging Services**

Recent trends in spending for imaging services are reported below—including both outpatient facility charges and separately billed physician charges. Inpatient facility charges for imaging services provided during a hospital stay are not included, as DRG payments (reported as inpatient spending in Section B) typically include such charges.

#### **1. Level of Spending for Imaging Services by Provider and Service Type**

Spending for imaging services—including facility charges and physician and other professional services charges totaled more than 9 percent of all spending for health care in 2008. Facility charges—nearly entirely from acute care hospitals—accounted for about two-thirds of all spending for imaging services. Standard imaging accounted for about one third of spending for imaging services.

- Total spending for imaging services—including facility charges and physician and other professional services charges—exceeded \$1.2 billion in 2008 (Figure E.1). Imaging services accounted for more than 9 percent of the estimated \$12.9 billion that residents spent for privately insured health care in 2008.
- Facility charges accounted for nearly two-thirds (64 percent) of all spending for imaging services in 2008—totaling nearly \$783 million (excluding professional charges that may include additional facility charges not billed separately). Acute-care hospitals accounted for nearly all facility charges for imaging services (99 percent or \$773.5 million). Charges for physician and other professional services associated with imaging totaled \$431.6 million in 2008.
- Standard imaging accounted for 35 percent of total spending for imaging services (including both professional and facility charges) in 2008, followed by MRIs (22 percent), CAT scans (20 percent), and echography/ultrasound (20 percent, Figure E.2).
- As might be expected, specialists (versus primary care physicians) provided more than 90 percent of professional imaging services—including nearly 100 percent of CAT scans and MRIs in 2008 (data not shown). Compared with other imaging services, echography/ultrasonography was least likely to be provided (81 percent) by a specialty physician.

#### **2. Annual Change in Spending for Imaging Services by Service Type**

Spending for imaging services grew faster than spending for all health care in both 2007 and 2008. Over both years, from 2006 to 2008, total spending on imaging services grew 21 percent. Somewhat slower growth in spending from 2008 than in 2007 reflected slower growth in charges for both professional services and hospital outpatient facilities. Nevertheless, in both years, facility costs grew about twice as fast as the cost of professional services.

- Spending for imaging services increased 21 percent from 2006 to 2008—more than 11 percent in 2007 and another 9 percent in 2008 (Figure E.1). In both years, spending for imaging services grew much faster than spending for all privately insured health care (7.5 percent).
- From 2006 to 2008, spending for facility charges grew more than twice as fast as spending for professional services related to imaging. Payments to facilities—nearly all outpatient hospital facilities—grew 27 percent over the two-year period: 15 percent from 2006 to 2007 and another 11 percent from 2007 to 2008 (Table E.1). Spending for professional services charges grew much more slowly: 13 percent from 2006 to 2008, or approximately 6 percent per year.
- Reflecting the much faster growth of outpatient facilities charges for imaging services, facilities charges accounted for a growing share of total spending for imaging: 65 percent in 2008, compared with 62 percent in 2006.
- Spending for standard imaging services (the largest single component of imaging expenditures) grew 25 percent from 2006 to 2008, with slower growth from 2007 to 2008 (8 percent) than the prior year (16 percent) (Figure E.3). Total spending also grew substantially for echography/ultrasound (24 percent from 2006 to 2008) and for MRIs (23 percent). From 2007 to 2008, spending for MRIs accelerated sharply, growing more than 14 percent that year.
- Standard imaging accounted for 40 percent of the overall increase in total spending for imaging services from 2007 to 2008, but nearly half of the annual growth in spending for imaging services from 2006 to 2007 (Figures E.4 and E.4a). Spending for MRIs accounted for 23 percent of the growth in total spending for imaging services from 2006 to 2008, but fully one third (33 percent) of the growth from 2007 to 2008.

### **3. Components of Growth in Average Spending for Imaging Services**

Growth in both spending per service and the number of services per member year drove higher spending for imaging services from 2006 to 2008. Both components contributed to the faster growth of spending for facilities than for physician and other professional services associated with imaging services.

- From 2006 to 2008, 14-percent growth in spending per service (unadjusted for case mix) and 12-percent growth in the number of services per member year drove 27-percent growth of payments to outpatient facilities for imaging services (Table E.2). (Recall that nearly all of these payments were made to hospital outpatient facilities.) Growth in both components slowed from 2007 to 2008, but spending per service continued to grow faster (6 percent) than the number of services per member year (5 percent).
- Average spending (per member year) for facility charges related to standard imaging services grew 37 percent from 2006 to 2007, faster than growth for any other type of imaging services. Much of this high growth was related to very fast growth in spending per service

from 2006 to 2007 (17 percent). Growth spending per standard imaging service fell to 5 percent from 2007 to 2008.

- From 2006 to 2008, the number of MRIs performed in outpatient facilities per member year grew 36 percent—15 to 17 percent per year. However, spending per service (unadjusted for case mix) declined (-4 percent), suggesting that many of the additional services entailed lower charges. However, both spending per service and the number of services per member year grew (4 percent and 16 percent, respectively) from 2007 to 2008, driving 20-percent growth in spending per member year.
- Compared with outpatient facility charges for imaging, spending per member year for physician and other professional services related to imaging grew relatively slowly from 2006 to 2008, about 13 percent (Table E.3). Spending per imaging service grew 5 percent from 2006 to 2008, while the number of services per member year grew 8 percent.

#### **4. High-Cost Imaging Services**

Digital (as opposed to film) mammography was a major component of the growth in spending for imaging services.

- Spending for screening digital mammography grew \$21 million from 2007 to 2008, accounting for 21 percent of the growth in total spending for imaging services in 2008 (Figure E.5).
- Growth in spending for diagnostic digital mammography (unilateral or bilateral) accounted for an additional 6 percent (\$5.5 million) of the growth in total spending for imaging services.

#### **5. Drivers of Imaging Expenditure Growth: Price, Volume, and Intensity**

Similar to the analysis in earlier sections, we developed a market basket of the imaging services provided in 2006 and 2007 in order to parse the independent effects of changes in price, volume, and intensity on spending for imaging services. This market basket included about 80 percent of total spending for imaging services each year. Again, changes in price may result from any or all of three potential changes: (1) providers may change the price of any given imaging service; (2) patients may change their use of providers, who may be paid a different price for the same imaging service; and (3) patients may change health plans, which may pay different providers different prices for the same imaging service.

While price increases were a major driver of growth in spending for imaging services in 2007, other factors were as important in driving spending growth. In 2007, growth in the volume of imaging services contributed strongly to spending growth, even adjusted for a slight movement toward a less costly service mix.

- Higher prices accounted for nearly half of the growth in total spending for imaging services from 2006 to 2007 (Table E.4). If the volume and mix of services had remained constant, changes in price alone would have increased spending for imaging services by 6 percent—compared with actual growth of 13 percent.
- Notwithstanding the importance of price in driving the growth of imaging services, increased volume of services also contributed significantly to greater spending for imaging in 2007. However, this effect was mitigated by a migration of the service mix to slightly less costly services.

## **6. Variation in Prices for Imaging Services**

For imaging procedures that accounted for the highest total spending, prices varied among carriers, facilities, and physician providers. For example:

- The highest price paid for digital mammography for screening (\$407) was more than three times the lowest price paid (\$130) in 2008 (Figure E.6). Professional charges for digital mammography similarly varied 3 to 1, ranging from \$30 to \$105 in 2008.
- Facility price differentials for various other major services were even greater. Facility charges for a CT scan of the abdomen varied from \$121 to \$1,808 in 2008. Facility charges for an MRI of a lower extremity joint varied similarly.

## **Section F: Efficiency:**

### **30-Day All-cause Hospital Readmissions**

High rates of hospital readmissions in Massachusetts and other states represent potentially significant problems of health care quality as well as avoidable cost.<sup>18</sup> An earlier report to DHCFP estimated rates of potentially preventable readmissions (PPR) in Massachusetts among commercial and HMO payers in 2005-2006, ranging from about 7.5 percent to nearly 9 percent.<sup>19</sup> The discussion below extends this work, evaluating readmission rates in 2007 overall and for 5 medical and 5 surgical DRGs associated with high rates of readmissions. However, but by necessity, the analysis is much simpler, using unadjusted rates of all-cause readmissions for medical and surgical DRGs within 30 days.<sup>20</sup>

Unadjusted rates of all-cause hospital readmission in 2007 and physician visits within 30 days (or between discharge and readmission, whichever came first) are reported below for medical and surgical admissions reported by three carriers.<sup>21</sup> We limited the sample to the three carriers using AP DRGs to be able to examine which medical and surgical DRGs had the highest rates of readmission. Because the analysis includes data from only three carriers and excludes maternity DRGs, admissions to out-of-state hospitals, and admissions for which the discharge date was missing, the number of admissions and expenditure amounts reported in this section differ from those presented in Section B.

#### **1. Rates of Readmissions and Average Cost**

About 7 percent of medical and surgical hospitalizations in 2007 resulted in at least one readmission. Readmissions and spending per member year were higher for medical DRGs than surgical DRGs, and higher in teaching than in non-teaching hospitals.

- About 8 percent of privately insured patients hospitalized for a medical DRG were readmitted within 30 days, either related to the initial hospitalization or otherwise (Table F.1). Among privately insured patients hospitalized for a surgical DRG, nearly 6 percent were readmitted within 30 days. Patients admitted to teaching hospitals had higher rates of readmissions for both medical and surgical DRGs compared with patients admitted to non-teaching hospitals.
- Readmissions accounted for 9 percent of total spending for hospital care for medical and surgical DRGs, equal to approximately \$49 per member year. Medical readmissions accounted for the most of this amount—\$32, compared with approximately \$17 for surgical readmissions (Table F.2).
- Readmissions to teaching hospitals accounted for 63 percent of the cost pmpm of readmissions for either surgical or medical DRGs—including 60 percent of the cost of medical DRGs and 68 percent of the cost of surgical DRGs (Table F.2).

## 2. Medical and Surgical DRGs with High Readmission Rates<sup>22</sup>

### DRG Type and Reasons for Readmissions

- All-cause readmissions corresponded to a wide range of index-admission DRGs. Taken together, the 5 medical and surgical DRGs with the highest readmission rates accounted for more than 9 percent of all readmissions (Table F.3).
- The 5 medical DRGs with the highest rates of readmissions included digestive, circulatory, cardiovascular, and respiratory diseases. These DRGs represented 6 percent of all medical index admissions and 8 percent of all medical readmissions (Table F.3). Ten to 46 percent of readmissions were for the same medical DRGs as the index hospitalization (Table F.4).
- The 5 surgical DRGs with the highest rates of readmissions included brain surgery, vascular procedures, stomach and bowel procedures, and major musculoskeletal procedures. These DRGs represented 6 percent of all surgical index admissions and 12 percent of surgical readmissions (Table F.3). Readmissions for these DRGs were less likely to be for the same DRG as the index admission: 6 to 16 percent of readmissions were for the same surgical DRGs as the index hospitalization (Table F.4).

### Average Expenditures

- The 5 medical and surgical DRGs with the highest readmission rates together accounted for low spending per member year (about \$5) (Table F.5). More than 70 percent of this amount, for both medical and surgical DRGs, was related to readmissions to teaching hospitals.

### Physician Visits Following Hospitalization

- Patients who were readmitted within 30 days were less likely to have seen a physician following discharge than patients who were not readmitted. Among all medical and surgical DRGs, 66 percent of patients who were readmitted saw a physician following discharge, compared with 73 percent of patients who were not readmitted. Similarly among the top 5 medical and surgical DRGs, 65 percent of patients who were readmitted saw a physician following discharge, compared with 79 percent of patients who were not readmitted (Table F.6).
- Patients with medical DRGs were less likely to see a physician when discharged from a teaching hospital than from a non-teaching hospital. In contrast, patients with surgical DRGs were more likely to visit a physician when discharged from a teaching hospital than from a non-teaching hospital. These patterns were apparent regardless of whether the patient was rehospitalized.



## Endnotes

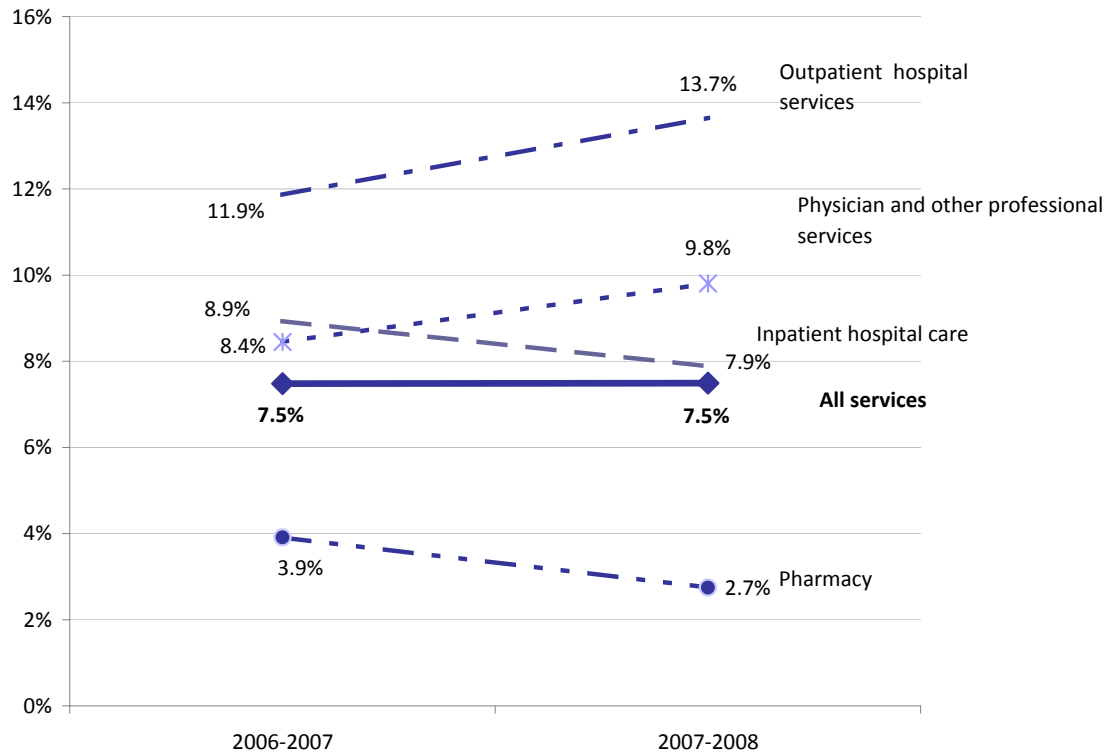
- <sup>1</sup> Centers for Medicaid & Medicare Services (CMS) [available at: <http://www.cms.hhs.gov/NationalHealthExpendData/downloads/proj2008.pdf>].
- <sup>2</sup> U.S. Department of Commerce, Bureau of Economic Analysis [<http://www.bea.gov/regional/spi/action.cfm>].
- <sup>3</sup> The carriers included most or all claims for services covered under capitation arrangements in their claims data. Because diverse service types may be provided in a capitation arrangement, carriers valued capitated services at their fee-for-service equivalent to support analysis of capitated claims by service type; these fee-for-service equivalents for capitated services are included throughout the analysis. We calculated a “capitation adjustment” for each carrier, equal to the difference between the carrier’s reported total capitation payments and the sum of the fee-for-service equivalents for capitated services. Capitation adjustments (that is, capitation payments net of estimated fee-for-service equivalent expenditures for services provided under capitation arrangements) are reported in the overview section. However, due to the level of aggregation with which capitation payments are reported, capitation adjustments are not reported by service type.
- <sup>4</sup> When employer plans “carve out” prescription drug coverage, the benefit is either insured or self-insured separately. If insured, another carrier writes a separate drug plan; when self-insured, the benefit may be administered by a pharmacy benefit manager, or PBM. An explanation of methods used to estimate claims incurred but not yet paid, as well as “carve out” expenditures for prescription drugs is provided in the methods appendix.
- <sup>5</sup> An earlier study of cost trends among enrollees in insured HMO company products (excluding some carriers as well as self-insured employer plans) found that expenditure growth pmpm in Massachusetts slowed from 2002 to 2006, from a 12-percent increase in expenditures pmpm in 2003 to 10- to 11-percent growth in both 2005 and 2006. See: Beth Fritchen, Kurt Giesa, and Charlie Louters, Trends in Health Claims for Fully-Insured Health Maintenance Organizations in Massachusetts, 2002-2006. Report to the Health Care Access Bureau of the Massachusetts Division of Insurance. Milwaukee, WI: Oliver Wyman, September 15, 2008 [available at <http://www.mass.gov/Eoca/docs/doi/Consumer/MAHMO-TrendReport.pdf>].
- <sup>6</sup> Other, non-physician professionals include (but may not be limited to) nurses other than primary care providers, midwives, podiatrists, therapists, psychologists, chiropractors, dentists, nutritionists, and dentists.
- <sup>7</sup> Net enrollment in the largest carriers’ insured groups declined by about 106,400 lives from 2006 to 2008, while net enrollment in self-insured groups and individual contracts increased by about 97,300 and 24,700 lives, respectively. Note that the number and distribution of covered lives reported here may vary from that reported in Welch and Giesa (2009); this report includes claims reported only for Massachusetts residents, while Welch and Giesa report premiums based on all lives (in or out of state) covered by Massachusetts carriers.
- <sup>8</sup> Nationally, the percentage of workers with a deductible of \$1,000 or more for single coverage increased from 10 percent in 2006 to 18 percent in 2008. Workers in small firms (with 3 to 199 workers) were more likely to have a general annual deductible of \$1,000 or more for single coverage (35 percent) than workers in larger firms (9 percent). While the percentage of workers in large firms with high deductibles did not increase significantly, the proportion of workers in small firms with deductibles of \$1,000 or more grew from 16 percent in 2006 to 35 percent in 2008. See: The Kaiser Family Foundation and Health Research & Educational Trust, Employer Health Benefits: 2008 Annual Survey [available at: <http://ehbs.kff.org/pdf/7790.pdf>].
- <sup>9</sup> The reduction in cost sharing in self-insured and large group plans probably reflects either no adjustment in benefit design or adjustments that did not keep pace with expenditure trends. Conversely, greater cost sharing in individual plans and for small and medium-sized groups apparently reflects increased deductibles (including new enrollment in high-deductible health plans), copayments, and/or coinsurance that exceeded expenditure trends.
- <sup>10</sup> By increasing the marginal cost of service use to the patient, greater cost sharing is widely believed to reduce total expenditures for health care. Seminal research estimating the magnitude of this relationship was conducted in the 1970s (see: J.P. Newhouse, W.G. Manning, C.N. Morris, et al., 1981. Some Interim Results from a Controlled Trial of Cost Sharing in Health Insurance. *New England Journal of Medicine* 305:1501-1507). More recent analyses of the impact of high-deductible health plans (HDHPs) on total expenditures focus on experience when those plans are coupled with a health savings account (for example, see: J.B. Christianson, et al., August 2004. “Consumer Experiences in a Consumer-Driven Health Plan,” *Health Services Research*, 39:4 Part II). These results, however, probably understate the impact of HDHPs on health services use and expenditures among middle- and low-income families (who are much less likely to elect an HDHP when offered a choice) and if employers do not also fund a health savings account. In 2009, twelve percent of firms offering health benefits offered an HDHP with a health reimbursement account (2 percent) or an HDHP that qualified for a health savings account, or HSA (10 percent)—about the same rates of offer as in 2008. Of those that offered an HSA-qualified HDHP, 29 percent made no employer contribution to the HSA (see: Kaiser Family Foundation, Employer Health Benefits 2009 Annual Survey [available at: <http://ehbs.kff.org>]). A comprehensive review of the research literature estimating the relationship between cost sharing and health services use and expenditures is provided in: S. Liu and D. Cholle, 2006. “Price and Income Elasticity of the Demand for Health Insurance and Health Care Services: A Critical Review of the Literature” [available at: <http://www.mathematica-mpr.com/publications/PDFs/priceincome.pdf>].
- <sup>11</sup> See Massachusetts Health Care Trends Part I: Private Health Insurance Premium Trends 2006-2008, Figure 2A.3.
- <sup>12</sup> In individual plans, spending for inpatient maternity care increased 17 percent in 2008.



- <sup>13</sup> The number of live births in Massachusetts was approximately 3 percent lower in 2006 (the most recent data available) than in 2003 (<http://wonder.cdc.gov>). The greatest decline occurred in preterm births, with gestation of fewer than 35 weeks. Slowing growth in maternity expenditures in 2008 was generally consistent with a continuation of these trends, as well as changes in enrollment and the demographic composition of privately insured residents.
- <sup>14</sup> This distribution of expenditures between teaching and nonteaching hospitals is consistent with a greater number of admissions to teaching hospitals. Conversely, among public payers in Massachusetts, nearly 60 percent of admissions are to community hospitals rather than teaching hospitals (Division of Health Care Finance and Policy analysis of inpatient discharge data, unpublished).
- <sup>15</sup> Freestanding facilities include ambulatory care centers, urgent care facilities, independent clinics, birthing centers, and comprehensive outpatient rehab facilities. Outpatient hospital care includes all ambulatory care services provided by an acute care hospital, including emergency room (ER) visits.
- <sup>16</sup> Types of service are based on the BETOS grouper, which classifies claims based on CPT code. The procedure category includes major procedures (such as hip or knee replacement) as well as minor or ambulatory procedures, endoscopies, dialysis, and radiation therapy.
- <sup>17</sup> Primary care includes general practitioners, family practitioners, internists, OB/GYNs, pediatricians, geriatricians, as well as physicians classified as practicing public health and general preventive medicine and adolescent medicine, and nurse practitioners. Specialists include all other MDs. Other professionals include all other nurses, as well as midwives, podiatrists, therapists, psychologists, chiropractors, dentists, nutritionists, dentists, and other nonphysician medical professionals.
- <sup>18</sup> A number of studies have pointed to improvements in care coordination at hospital discharge, with appropriate follow-up care either in a post-acute facility or in the community, as promising ways to avoid rehospitalization. For example, see: Coleman et al. The Care Transitions Intervention: Results of a Randomized Controlled Trial. *Archives Internal Medicine* 2006; 166 (17): 1822-28.
- <sup>19</sup> Division of Health Care Finance and Policy, Potentially Preventable Readmissions, 3M Methodology report, unpublished.
- <sup>20</sup> The 3M report included only hospitalizations that were likely to be preventable and readmissions that were plausibly related to the initial hospitalization. In addition, 3M adjusted for case-mix and severity of illness by DRG.
- <sup>21</sup> Admissions for maternity and newborn care are excluded from the analyses, as are any admissions with unknown or missing DRG data.
- <sup>22</sup> We identified medical and surgical DRGs with high readmission rates among the 30 most frequent medical and surgical DRGs overall. Among these most frequent 30 medical and surgical DRGs, we then identified the 5 DRGs with the highest readmission rates.

## **Tables and Figures**

**Figure A.1: Annual Rate of Growth in Spending per Member Year by Type of Service, 2006-2008**

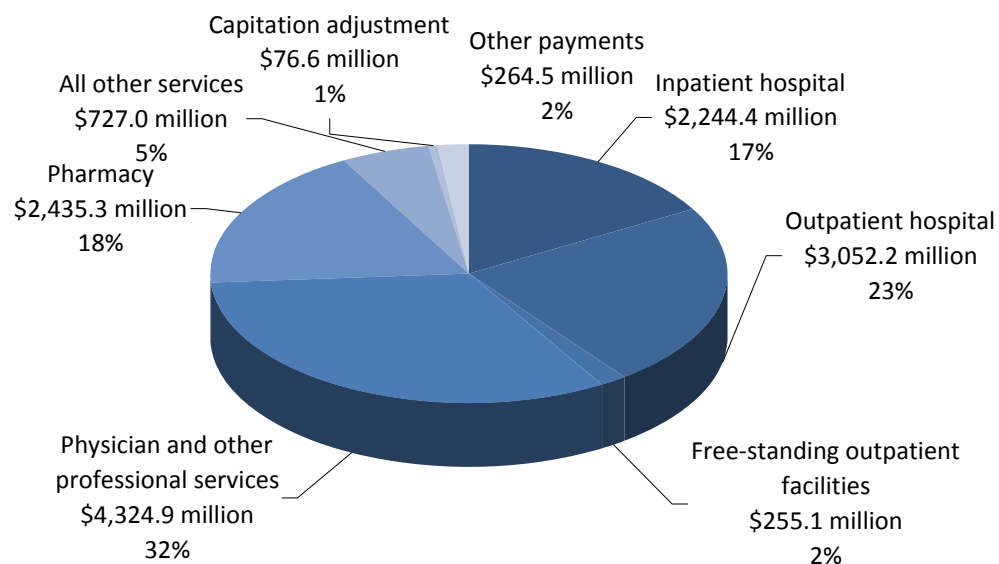


Sources: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Note: Data reflect reporting carriers' insured and self-insured business.

**Figure A.2: Distribution of Total Spending for Privately Insured Health Care in Massachusetts,  
by Type of Service, 2008**

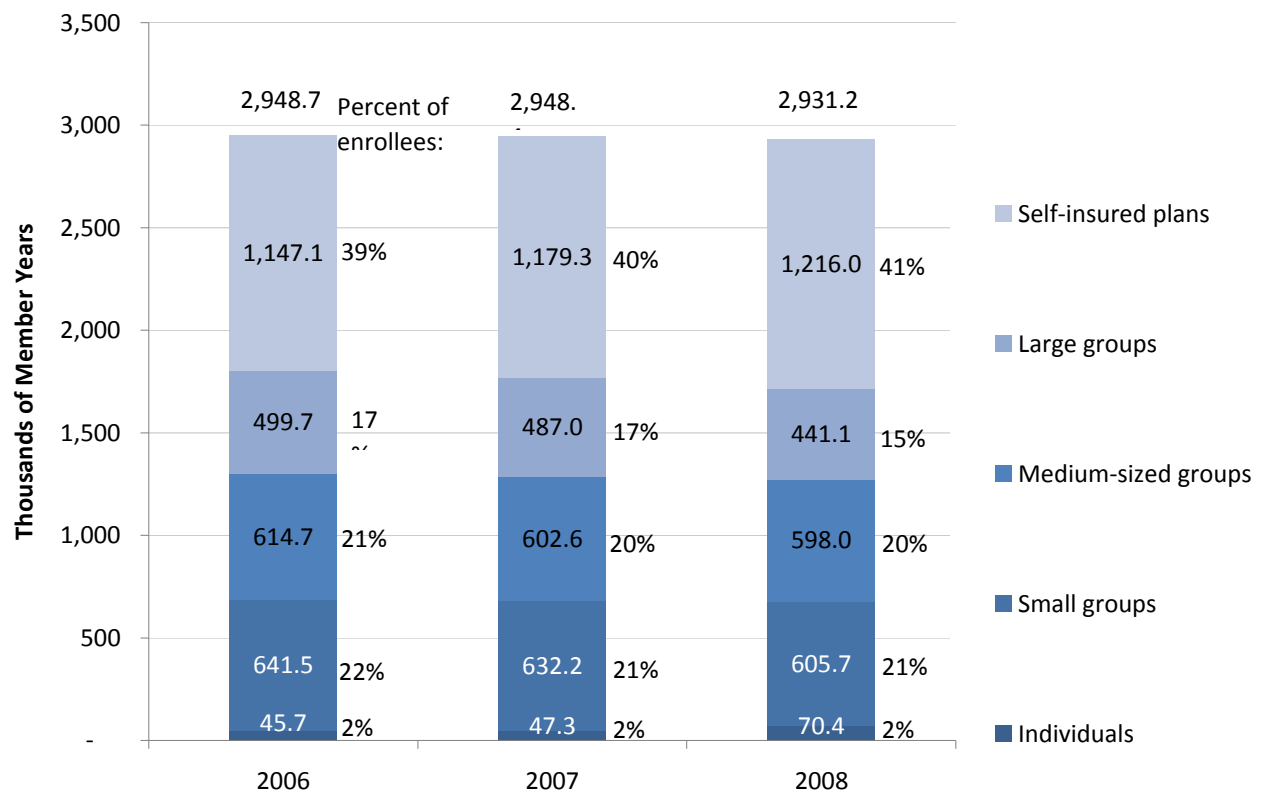
**Total: \$13.0 billion**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Inpatient and outpatient facility expenditures exclude professional services billed separately. "All other services" includes skilled nursing facilities, non-acute institutional care, and other unclassified claims. Capitated claims are valued at the fee-for-service equivalent. The capitation adjustment reconciles total capitation payments and the fee-for-service equivalents that carriers reported at the claims level; other reported payments include pay-for-performance incentive payments and network management fees that did not flow through the claims system.

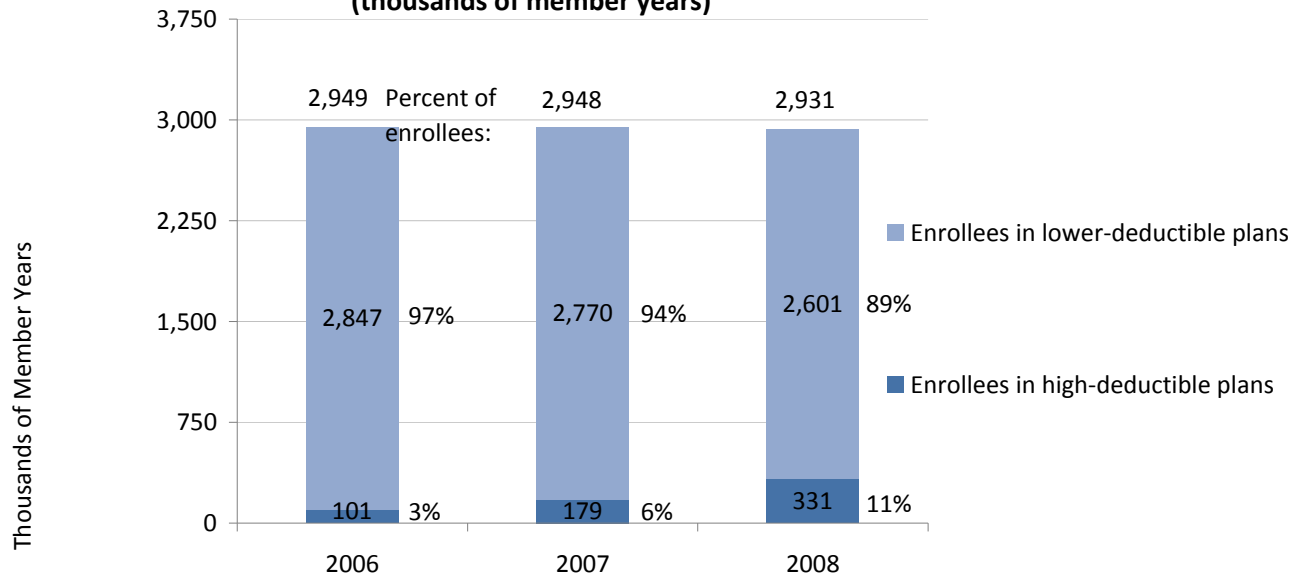
**Figure III.A.3: Total Resident Enrollment by Private Insurance Market Sector, 2006-2008  
(thousands of member years)**



Source: Mathematica Policy Research analysis of enrollment data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: A small group is an “eligible small business or group” defined per Massachusetts Division of Insurance Regulation 211 CMR 66.04; employers that have fewer than 51 enrollees but do not meet the definition of an eligible small employer are included as a medium-sized group, together with employers with 51-499 enrolled employees; large groups include employers with 500 or more enrolled employees.

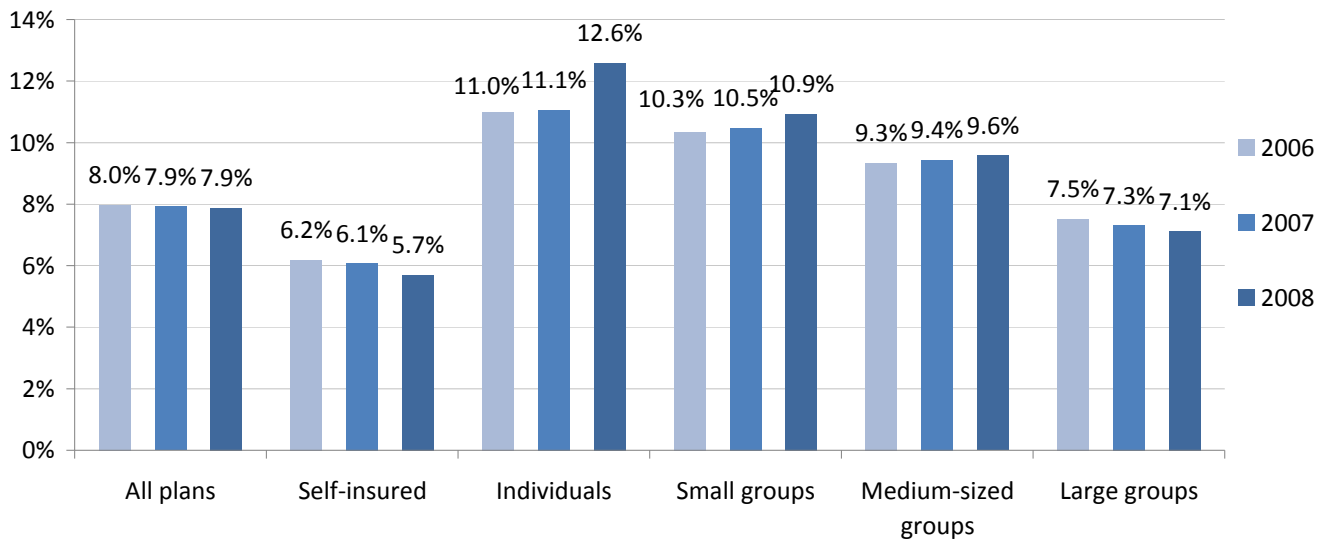
**Figure III.A.4 Enrollment in High-Deductible Plans, 2006-2008**  
(thousands of member years)



Source: Mathematica Policy Research analysis of enrollment data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Note: High-deductible plans are plans with a deductible above \$1,000.

**Figure A.5: Consumer Cost Sharing as a Percent of Total Spending for Insured Services  
by Insurance Market Sector, 2006-2008**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Cost sharing includes deductibles, coinsurance amounts, and copayments, but do not include consumer (or employee contributions to) premiums. Capitated claims and claims with third party payers are excluded.



**Table A.1 Total Spending, Spending per Member Year, and Rates of Change, 2006-2008**

				Percent change:		Total change 2006-
	2006	2007	2008	2006-2007	2007-2008	2008
<i>Total expenditures (in millions):</i>						
All services	\$11,650	\$12,520	\$13,380	7.5%	6.9%	14.8%
Inpatient hospital care	\$1,921	\$2,093	\$2,244	8.9%	7.3%	16.8%
Outpatient services	\$2,712	\$2,977	\$3,307	9.8%	11.1%	22.0%
Outpatient hospital	\$2,415	\$2,701	\$3,052	11.8%	13.0%	26.4%
Other outpatient facilities	\$297	\$275	\$255	-7.2%	-7.4%	-14.0%
Physician and other professional services	\$3,654	\$3,962	\$4,325	8.4%	9.2%	18.4%
Pharmacy	\$2,295	\$2,384	\$2,435	3.9%	2.1%	6.1%
All other services	\$701	\$742	\$727	5.9%	-2.1%	3.7%
Adjustments	\$368	\$363	\$341	n.a.	n.a.	n.a.
Capitation adjustment	\$107	\$99	\$77	n.a.	n.a.	n.a.
Other payments	\$261	\$264	\$265	1.0%	0.4%	1.4%
<i>Percent of total spending</i>						
All services <sup>a</sup>	100.0%	100.0%	100.0%	b	b	b
Inpatient hospital care	17.0%	17.2%	17.2%	0.2%	0.0%	0.2%
Outpatient services	24.0%	24.5%	25.4%	0.4%	0.9%	1.3%
Hospitals	21.4%	22.2%	23.4%	0.8%	1.2%	2.0%
Other free-standing facilities	2.6%	2.3%	2.0%	-0.4%	-0.3%	-0.7%
Physician and other professional services	32.4%	32.6%	33.2%	0.2%	0.6%	0.8%
Pharmacy	20.3%	19.6%	18.7%	-0.7%	-0.9%	-1.7%
All other services	6.2%	6.1%	5.6%	-0.1%	-0.5%	-0.6%
<i>Spending per member year:</i>						
All services <sup>a</sup>	\$3,951	\$4,247	\$4,565	7.5%	7.5%	15.5%
Inpatient hospital care	\$652	\$710	\$766	8.9%	7.9%	17.5%
Outpatient services	\$920	\$1,010	\$1,128	9.8%	11.8%	22.7%
Hospitals	\$819	\$916	\$1,041	11.9%	13.7%	27.1%
Other free-standing facilities	\$101	\$93	\$87	-7.2%	-6.8%	-13.5%
Physician and other professional services	\$1,239	\$1,344	\$1,475	8.4%	9.8%	19.1%
Pharmacy	\$778	\$809	\$831	3.9%	2.7%	6.8%
All other services	\$238	\$252	\$248	5.9%	-1.5%	4.3%

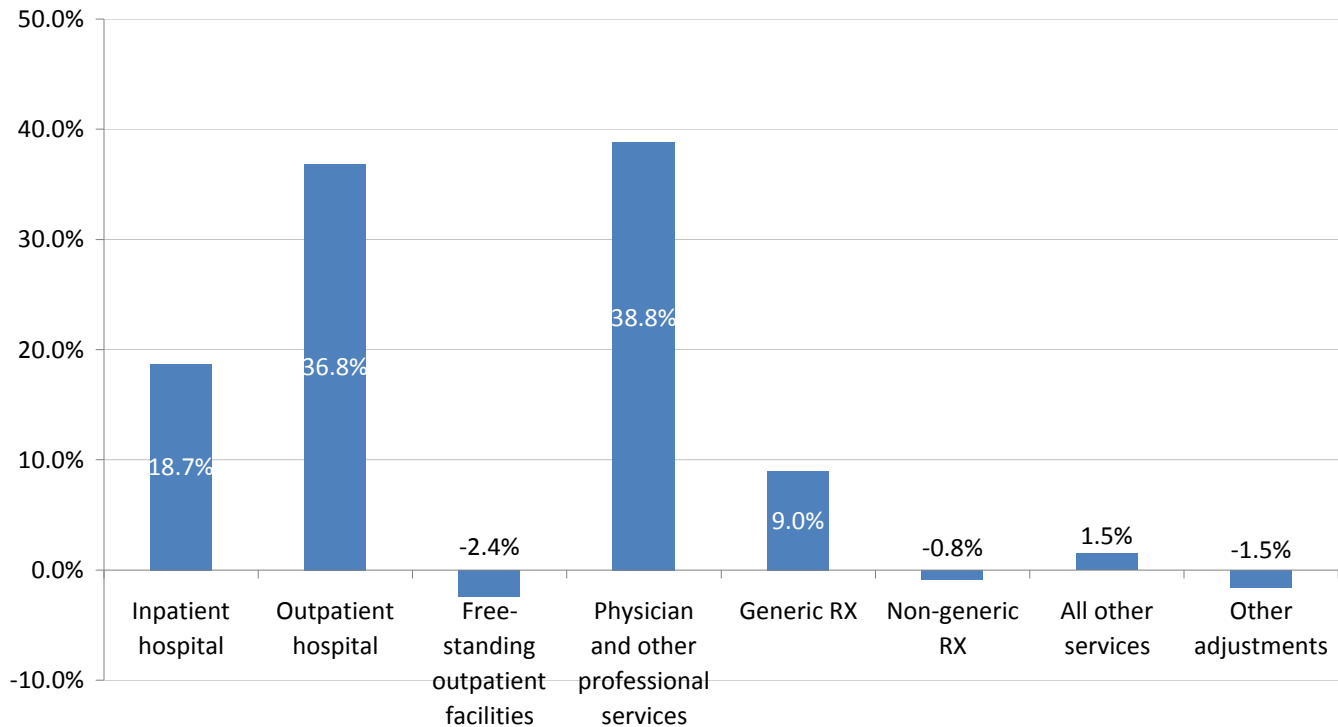
Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

<sup>a</sup> Expenditures for all services includes carrier payments that do not flow through the claims system. As a result, detail by service type may not sum to the pmpm expenditures for all services.

<sup>b</sup> Percent change is calculated as the change in percentage points.

Notes: Inpatient and outpatient facility expenditures exclude professional services billed separately. All other claims includes skilled nursing facilities, non-acute institutional care, and other unclassified claims. Capitated claims are valued at the fee-for-service equivalent. Capitation adjustments reconcile total capitation payments and the fee-for-service equivalents that carriers reported at the claims level; other reported payments include pay-for-performance incentive payments and network management fees that did not flow through the claims system.

**Figure A.6: Growth in Spending by Service Type as a Percent of Total Spending Growth, 2006-2008**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Inpatient and outpatient facility expenditures exclude professional services billed separately. All other claims includes skilled nursing facilities, non-acute institutional care, and other unclassified claims. Capitated claims are valued at the fee-for-service equivalent. Other adjustments include reconciliation of total capitation payments and the fee-for-service equivalents that carriers reported at the claims level, plus other reported payments (such as pay-for-performance incentive payments and network management fees) that did not flow through the claims system.

**Table A.2 Total Spending, Spending Per Member Year, and Rates of Growth by Insurance Market Sector, 2006-2008**

	All enrollees	Self-insured plans	Individuals	Small groups	Medium-sized groups	Large groups
<b>Total spending (in millions)</b>						
2006	\$11,282.4	\$4,687.7	\$255.3	\$2,292.6	\$2,157.3	\$1,889.4
2007	\$12,157.6	\$5,160.5	\$275.6	\$2,428.5	\$2,297.0	\$1,996.0
2008	\$13,038.8	\$5,774.6	\$401.0	\$2,497.2	\$2,421.8	\$1,944.3
<i>Rates of growth</i>						
Total 2006-2008	15.6%	23.2%	57.1%	8.9%	12.3%	2.9%
2006-2007	7.8%	10.1%	8.0%	5.9%	6.5%	5.6%
2007-2008	7.2%	11.9%	45.5%	2.8%	5.4%	-2.6%
<i>Percent of growth</i>						
Total 2006-2008	100.0%	61.9%	8.3%	11.6%	15.1%	3.1%
2006-2007	100.0%	54.0%	2.3%	15.5%	16.0%	12.2%
2007-2008	100.0%	69.7%	14.2%	7.8%	14.2%	-5.9%
<b>Spending per member year</b>						
2006	\$3,951	\$4,087	\$5,584	\$3,574	\$3,510	\$3,781
2007	\$4,247	\$4,376	\$5,827	\$3,841	\$3,812	\$4,098
2008	\$4,565	\$4,749	\$5,696	\$4,123	\$4,050	\$4,408
<i>Rates of growth</i>						
Total 2006-2008	15.5%	16.2%	2.0%	15.4%	15.4%	16.6%
2006-2007	7.5%	7.1%	4.4%	7.5%	8.6%	8.4%
2007-2008	7.5%	8.5%	-2.2%	7.3%	6.2%	7.5%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Capitation adjustments and other payments reported by carriers that did not flow through the claims system are excluded in the market sector detail, but included in all-enrollee expenditures.

**Table A.3: Drivers of Expenditure Growth by Type of Service, 2006-2007**

Type of Service	Annual Percent Growth in Spending	Percentage Point Change in Spending Due to the Change in:		
		Price	Number of service units	Service mix
Teaching hospital inpatient care	8.5%	8.8%	0.4%	-0.7%
Non-teaching hospital inpatient care	8.5%	9.8%	-2.1%	0.8%
Hospital outpatient services <sup>a</sup>	12.1%	6.6%	7.3%	-1.8%
Physician and other professional services	7.9%	8.7%	1.9%	-2.7%
Imaging services <sup>b</sup>	12.9%	6.0%	7.9%	-1.0%

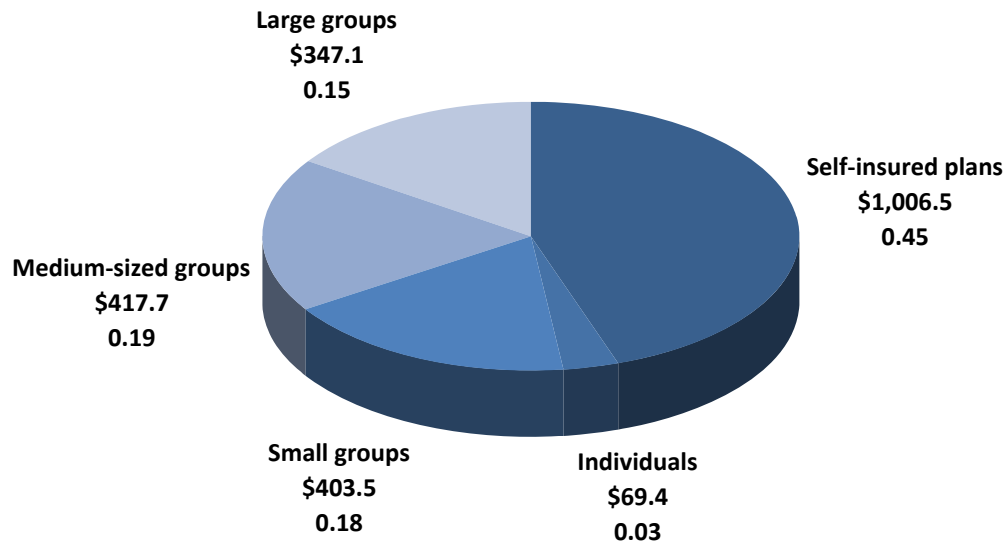
Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Because of the relatively high rate of incurred but not reported claims in 2008, only 2006-2007 growth drivers are reported. The figures reported in the table were calculated for a “market basket” of services, representing about 90 percent of total spending in each major service category each year. Therefore, percentage growth rates reported here may differ from those presented elsewhere in the analysis.

<sup>a</sup> Estimate includes only facility charges. Physician and other professional charges, when billed separately, are excluded.

<sup>b</sup> Estimate includes facility and professional fees. Inpatient facility charges for imaging services provided during a hospital stay are not included.

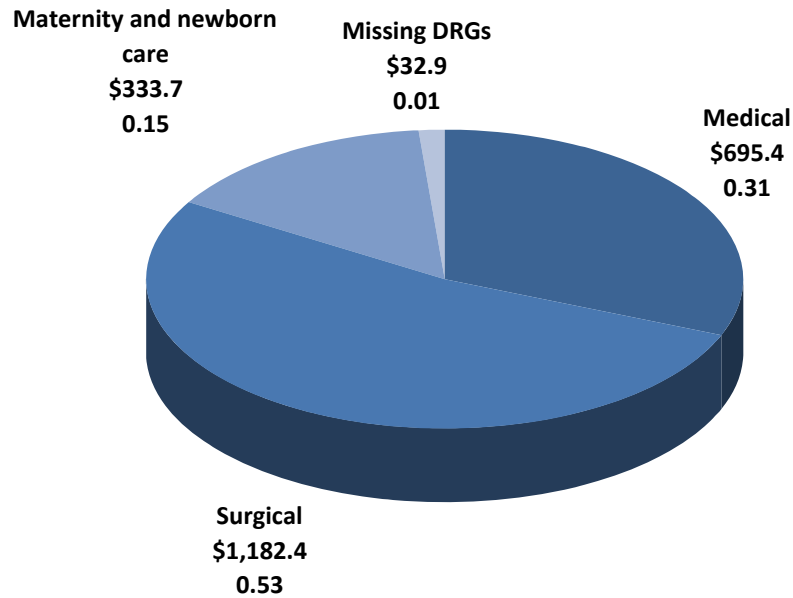
**Figure B.1: Total Spending for Privately Insured Hospital Inpatient Care by Insurance Market Sector, 2008**  
(\$ millions)



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data only include facility charges for care provided at acute inpatient facilities. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.

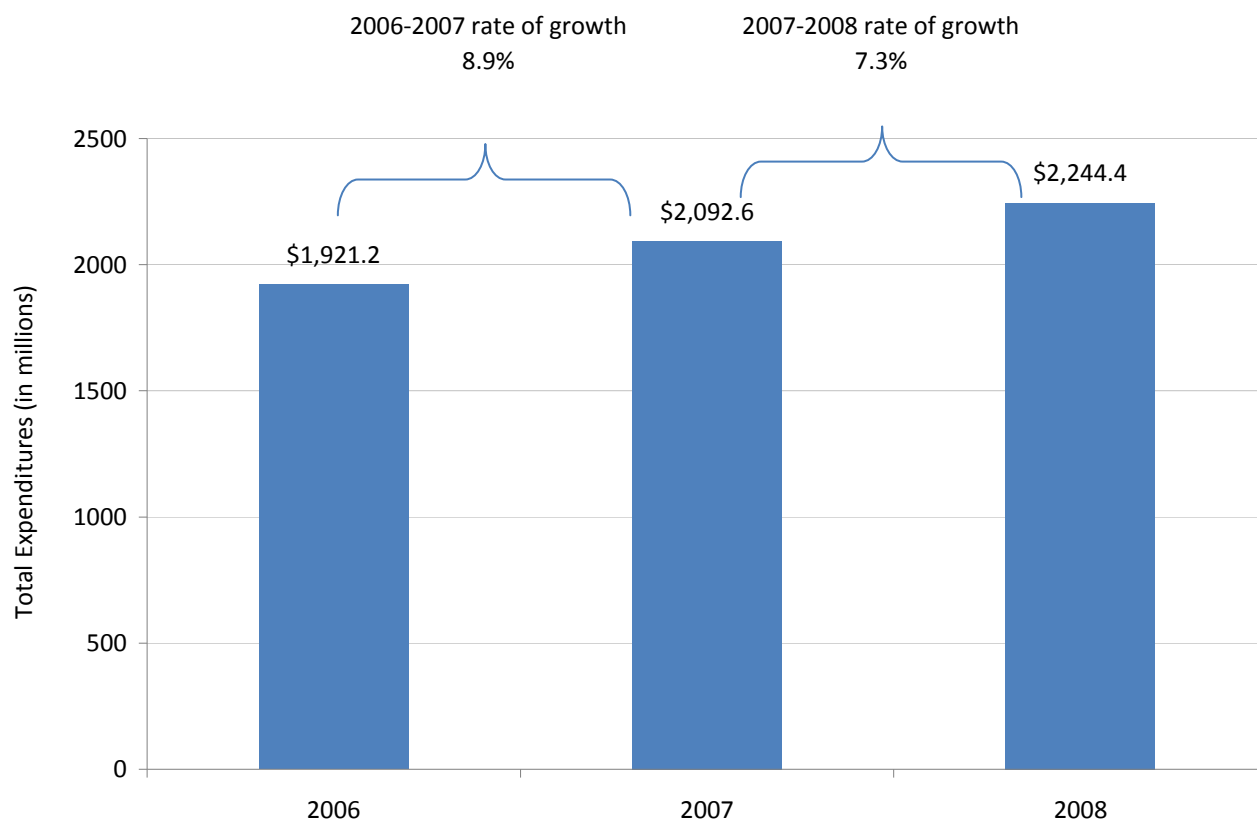
**Figure B.2: Total Spending for Privately Insured Hospital Inpatient Care by Type of Service,  
2008  
(\$ millions)**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data only include facility charges for care provided at acute inpatient facilities. Mental health and substance abuse services are included in medical services. All hospitalizations for pregnancy and childbirth as well as newborns and other neonates are included in the maternity category. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.

**Figure B.3: Total Spending for Privately Insured Hospital Inpatient Care and Annual Rate of Growth, 2006-2008**



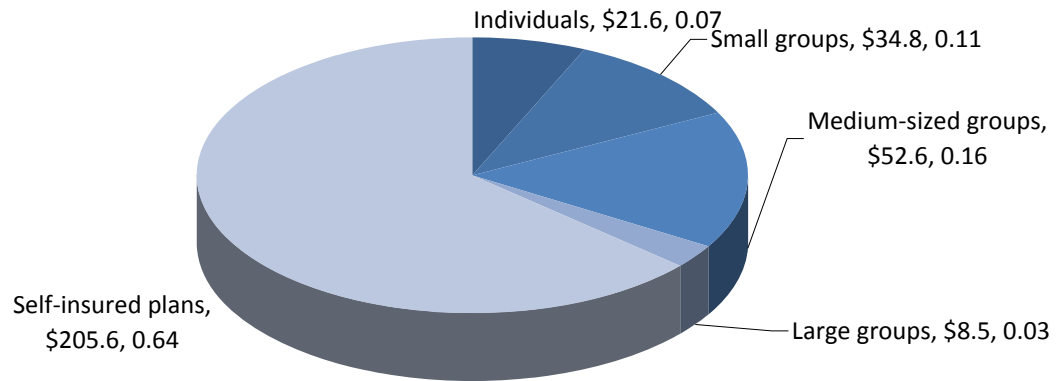
Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data only include facility charges for care provided at acute inpatient facilities. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.



**Figure B.4: Change in Total Spending for Privately Insured Hospital Inpatient Care and Percent of Change by Insurance Market Sector, 2006-2008 (\$ millions)**

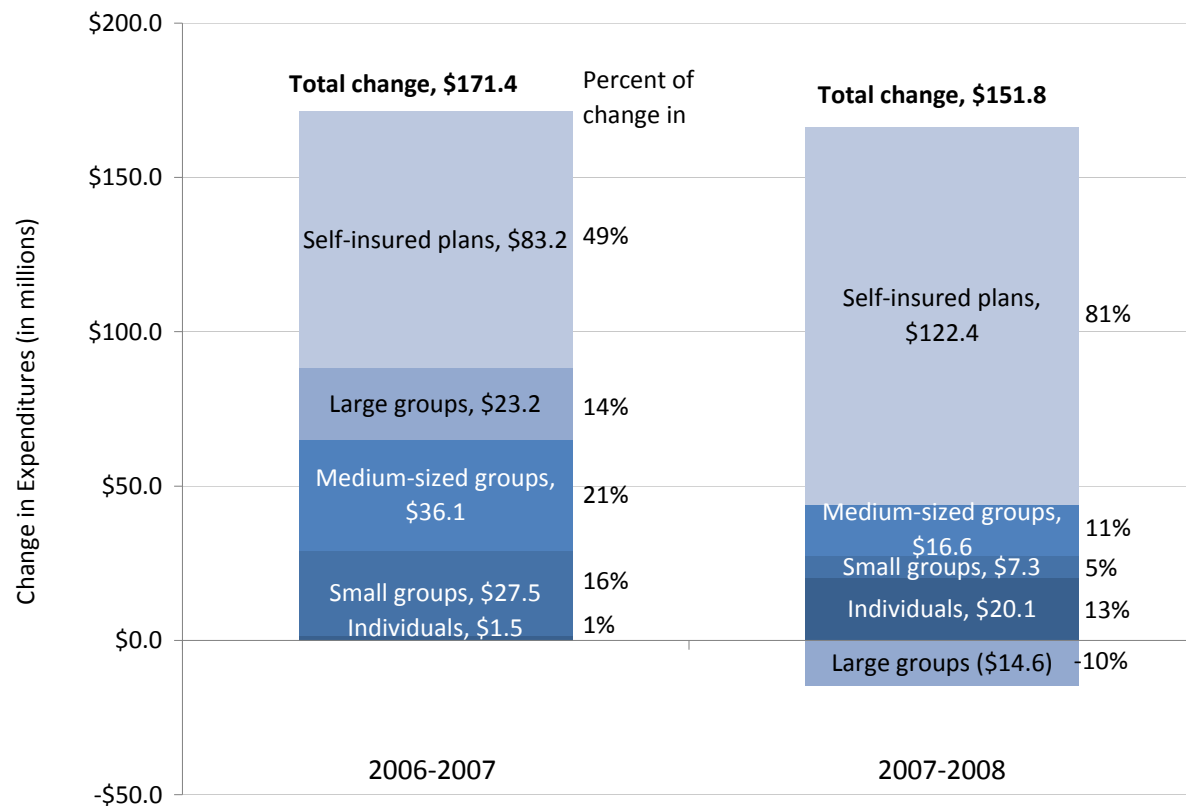
**Total change in inpatient spending = \$323.2 million**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include only facility charges for care provided at acute inpatient facilities. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.

**Figure B.4.a: Annual Change in Total Spending for Privately Insured Hospital Inpatient Care and Percent of Change by Insurance Market Sector, 2006-2008 (\$ millions)**

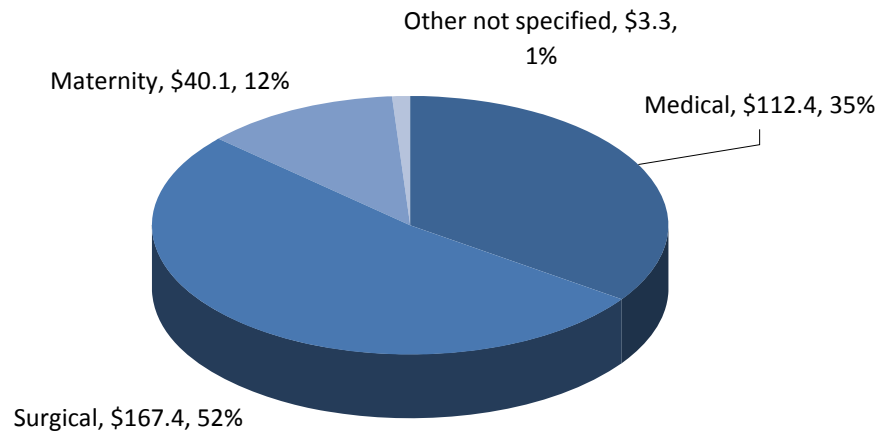


Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include only facility charges for care provided at acute inpatient facilities. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.

**Figure B.5: Change in Total Spending for Privately Insured Hospital Inpatient Care and Percent of Change by Type of Service, 2006-2008 (\$ millions)**

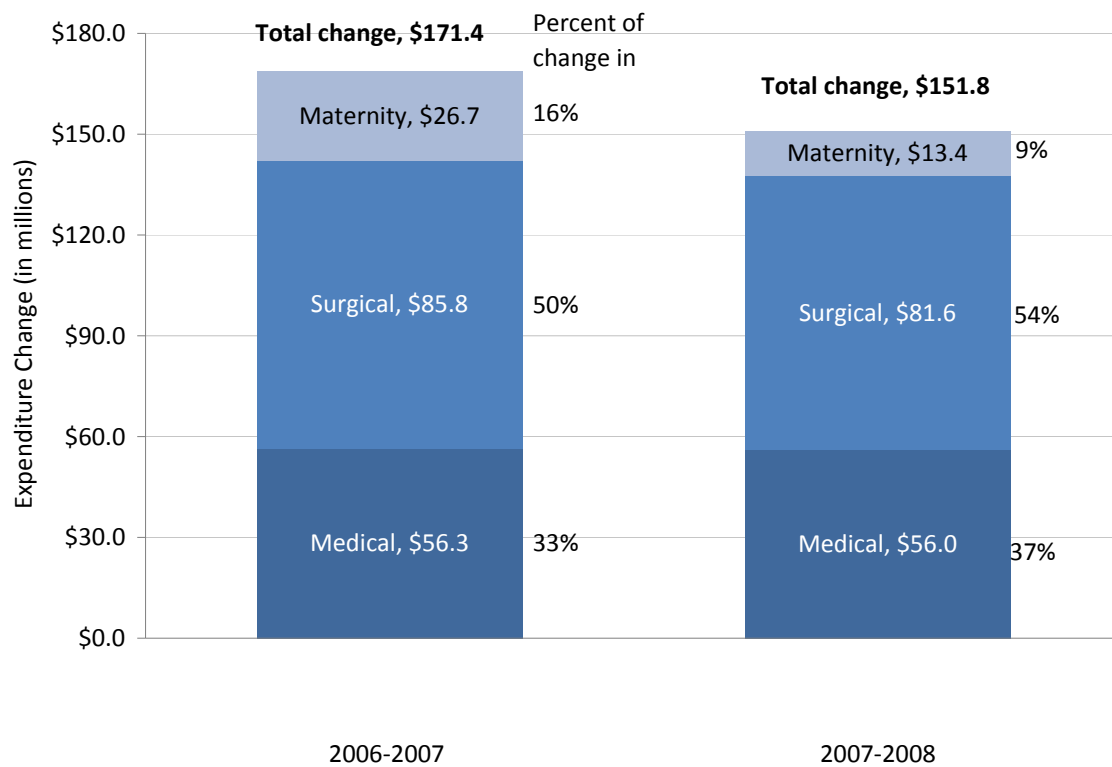
**Total change in inpatient spending = \$323.2 million**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data only include facility charges for care provided at acute inpatient facilities. "Other not specified" includes hospitalizations with unknown or unclassifiable DRGs. Mental health and substance abuse services are included in medical services. All hospitalizations for pregnancy and childbirth as well as newborns and other neonates are included in the maternity category. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.

**Figure B.5.a: Annual Change in Total Spending for Privately Insured Hospital Inpatient Care and Percent of Change by Type of Service, 2006-2008 (\$ millions)**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data only include facility charges for care provided at acute inpatient facilities. Hospitalizations with unknown or unclassifiable DRGs are not displayed. Mental health and substance abuse services are included in medical services. All hospitalizations for pregnancy and childbirth as well as newborns and other neonates are included in the maternity category. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude

**Table B.1: Spending Per Member Year for Privately Insured Hospital Inpatient Services by Insurance Market Sector and Percent Change, 2006-2008**

	Fully-insured					Self-insured plans
	All plans	Individuals	Small groups	Medium-sized groups	Large groups	
2006	\$652	\$1,047	\$575	\$594	\$678	\$698
2007	\$710	\$1,043	\$627	\$666	\$743	\$750
2008	\$766	\$986	\$666	\$699	\$787	\$828
Percent change, 2006-2008	17.5%	-5.8%	15.9%	17.6%	16.1%	18.5%
2006-2007	8.9%	-0.4%	9.0%	12.1%	9.6%	7.4%
2007-2008	7.9%	-5.4%	6.3%	4.9%	5.9%	10.4%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data only include facility charges for care provided at acute inpatient facilities. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.

**Table B.2: Components of Change in Spending for Privately Insured Hospital Inpatient Care Per Member Year by Type of Service, 2006-2008**

	Inpatient Spending per Member Year	Spending per Admission	Admissions per 1,000 Member Years	Number of Days per Admission	Spending per Day
<b>Total inpatient hospital services</b>					
2008	\$766	\$11,484	66.67	4.10	\$2,799
Percent growth, 2006-2008	17.5%	18.1%	-0.5%	1.3%	16.6%
2006-2007	8.9%	9.7%	-0.7%	0.9%	8.7%
2007-2008	7.9%	7.7%	0.2%	0.4%	7.3%
<i>By Type of Inpatient Service:</i>					
<b>Medical</b>					
2008	\$237	\$8,946	26.52	4.27	\$2,094
Percent growth, 2006-2008	20.0%	17.1%	2.5%	1.2%	15.6%
2006-2007	9.7%	9.5%	0.2%	1.0%	8.4%
2007-2008	9.4%	6.9%	2.3%	0.2%	6.7%
<b>Surgical</b>					
2008	\$403	\$21,489	18.77	4.34	\$4,952
Percent growth, 2006-2008	17.2%	17.2%	0.0%	-1.7%	19.3%
2006-2007	8.5%	9.4%	-0.9%	-0.3%	9.7%
2007-2008	8.0%	7.1%	0.8%	-1.5%	8.7%
<b>Maternity and newborn care</b>					
2008	\$114	\$5,575	20.42	3.68	\$1,513
Percent growth, 2006-2008	14.3%	20.2%	-4.9%	3.5%	16.1%
2006-2007	9.1%	11.2%	-1.9%	1.2%	9.9%
2007-2008	4.8%	8.1%	-3.1%	2.4%	5.6%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data only include facility charges for care provided at acute inpatient facilities and exclude missing DRGs. One carrier's data are excluded in the calculation of average length of stay because the discharge date was missing on the inpatient data file. Mental health and substance abuse services are included in medical services. All hospitalizations for pregnancy and childbirth as well as newborns and other neonates are included in the maternity category. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data. The number of admissions and days were adjusted for missing data in 2007 and 2008; see methods appendix for details.

**Table B.3: Components of Change in Spending per Member Year for Privately Insured Hospital Inpatient Care by Insurance Market Sector, 2006-2008**

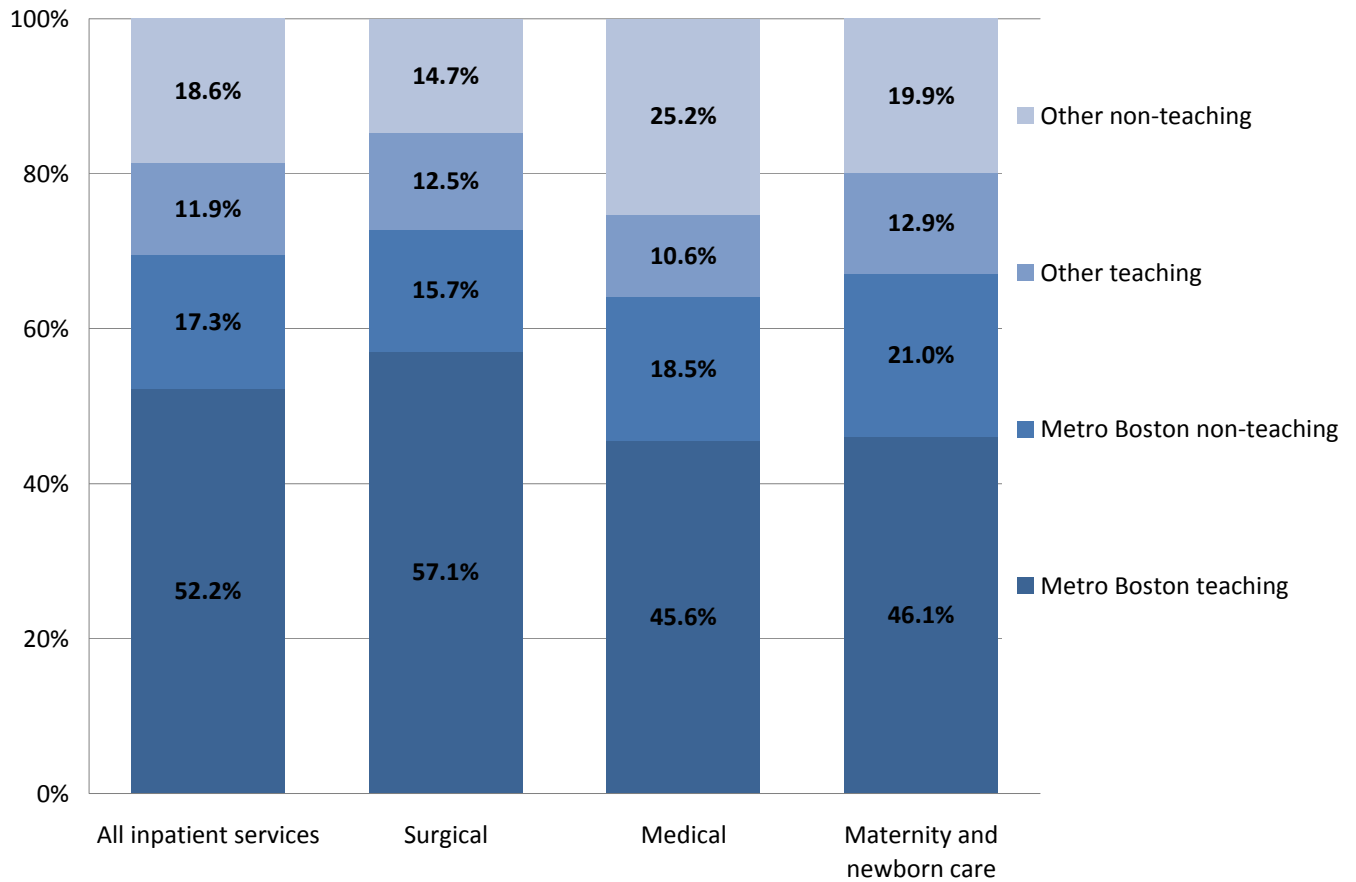
	Inpatient Spending per Member Year	Spending per Admission	Admissions per 1,000 Member Years	Number of Days per Admission	Spending per Day
<i>Self-insured plans</i>					
2008	\$828	\$11,654	71.02	4.15	\$2,807
Percent growth, 2006-2008	18.5%	17.5%	0.8%	0.2%	17.3%
2006-2007	7.4%	8.4%	-0.9%	0.7%	7.7%
2007-2008	10.4%	8.5%	1.8%	-0.5%	9.0%
<i>Fully-insured:</i>					
<i>Individuals</i>					
2008	\$986	\$12,799	77.05	4.52	\$2,832
Percent growth, 2006-2008	-5.8%	10.5%	-14.7%	-8.5%	20.8%
2006-2007	-0.4%	6.4%	-6.3%	-6.7%	14.0%
2007-2008	-5.4%	3.9%	-9.0%	-1.9%	5.9%
<i>Small groups</i>					
2008	\$666	\$11,363	58.64	3.93	\$2,892
Percent growth, 2006-2008	15.9%	20.5%	-3.8%	1.1%	19.2%
2006-2007	9.0%	10.9%	-1.7%	1.7%	9.0%
2007-2008	6.3%	8.6%	-2.1%	-0.6%	9.3%
<i>Medium-sized groups</i>					
2008	\$699	\$10,946	63.82	4.01	\$2,727
Percent growth, 2006-2008	17.6%	19.4%	-1.5%	2.2%	16.8%
2006-2007	12.1%	12.4%	-0.3%	1.1%	11.2%
2007-2008	4.9%	6.2%	-1.2%	1.1%	5.0%
<i>Large groups</i>					
2008	\$787	\$11,584	67.93	4.03	\$2,874
Percent growth, 2006-2008	16.1%	15.6%	0.4%	-0.3%	15.9%
2006-2007	9.6%	9.0%	0.5%	-0.5%	9.6%
2007-2008	5.9%	6.1%	-0.1%	0.2%	5.8%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include facility charges only for care provided at acute inpatient facilities. United Health Care is excluded in the calculation of average length of stay because the discharge date is missing on the inpatient data file. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data. The number of admissions and days were adjusted for missing data in 2007 and 2008; see methods appendix for details.



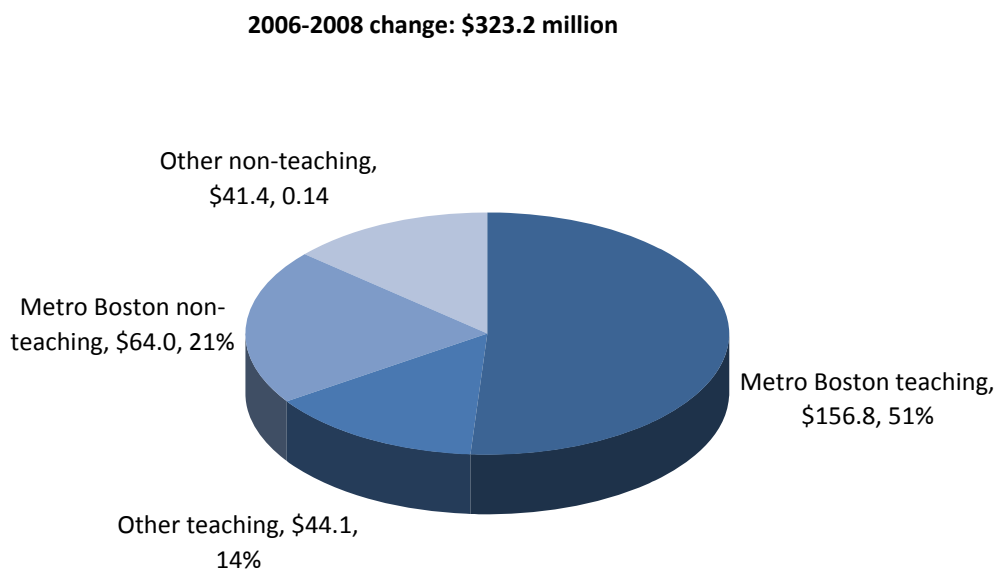
**Figure B.6: Distribution of Spending for Privately Insured Inpatient Care by Hospital Teaching Status, 2008**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data only include facility charges for care provided at acute inpatient facilities. Expenditures for out-of-state hospitals are excluded, as are expenditures for a small number of in-state facilities for which either location or teaching status was unidentified. Mental health and substance abuse services are included in medical services. All hospitalizations for pregnancy and childbirth as well as newborns and other neonates are included in the maternity category. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.

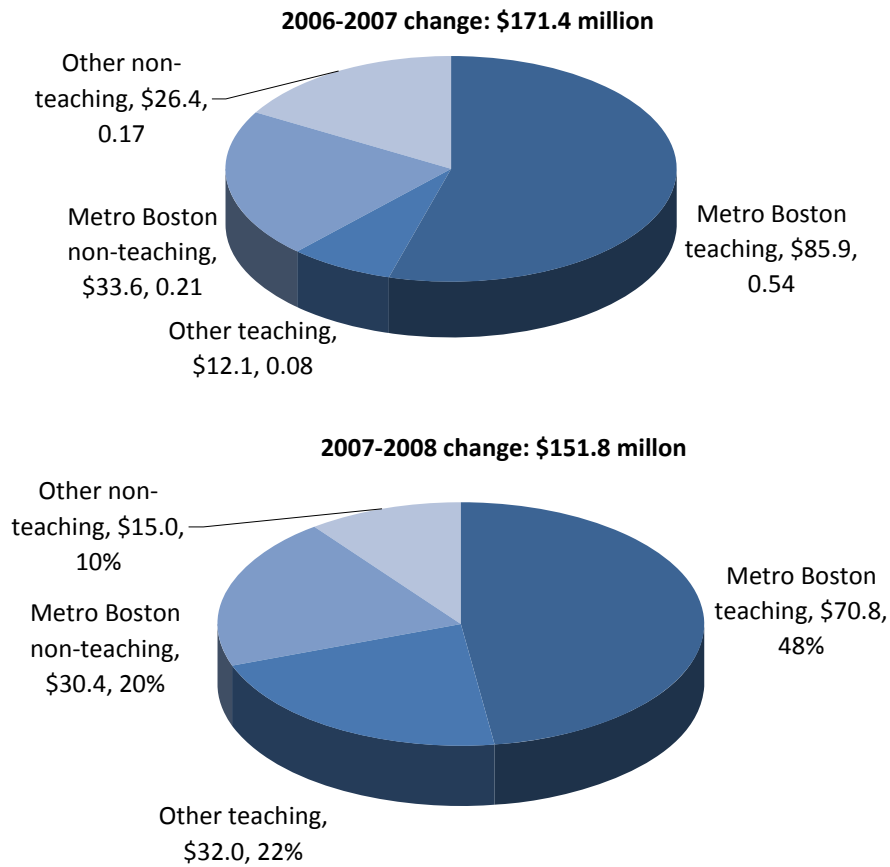
**Figure B.7: Distribution of the Change in Total Spending for Privately Insured Inpatient Care by Hospital Type and Metro Boston Location, 2006-2008 (\$ millions)**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include only facility charges for care provided at acute inpatient facilities. Expenditures for out-of-state hospitals and a small number of in-state facilities where either location or teaching status was unidentified are not displayed. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.

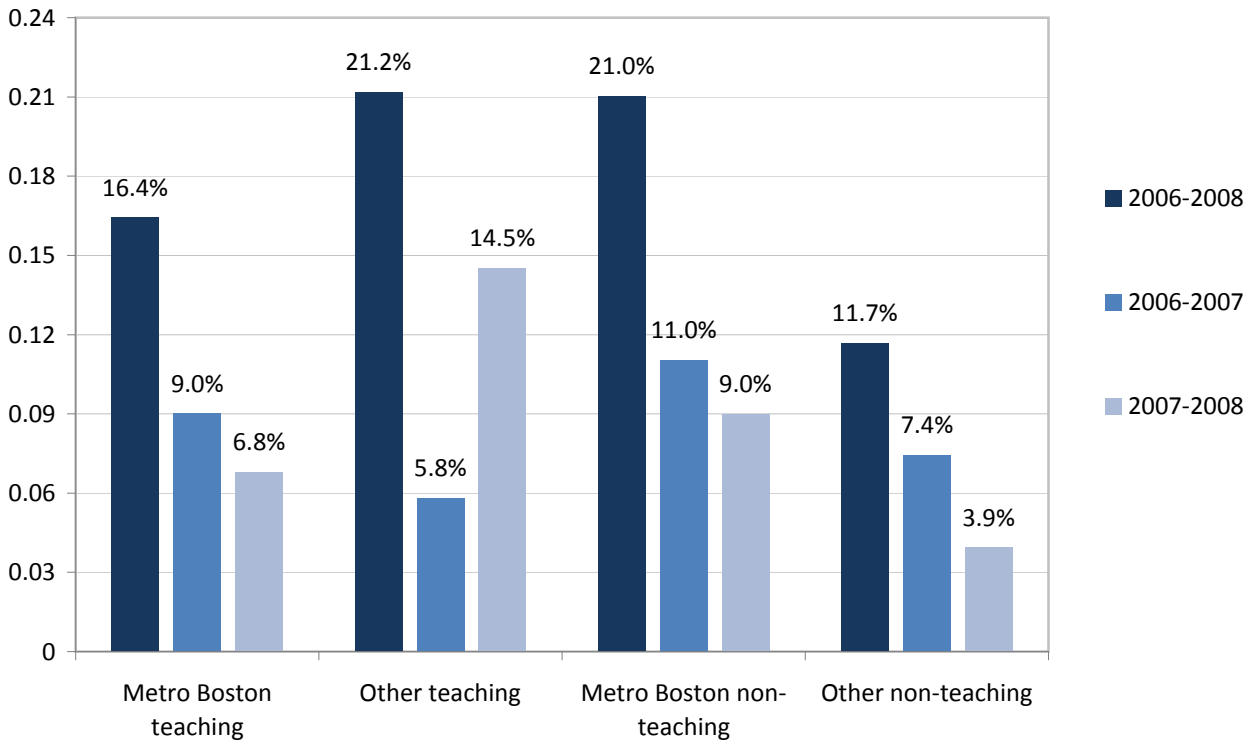
**Figure B.7.a: Distribution of the Change in Total Spending for Privately Insured Hospital Inpatient Care by Hospital Type and Metro Boston Location, 2006-2007 and 2007-2008 (\$ millions)**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include only facility charges for care provided at acute inpatient facilities. Expenditures for out-of-state hospitals and a small number of in-state facilities where either location or teaching status was unidentified are not displayed. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.

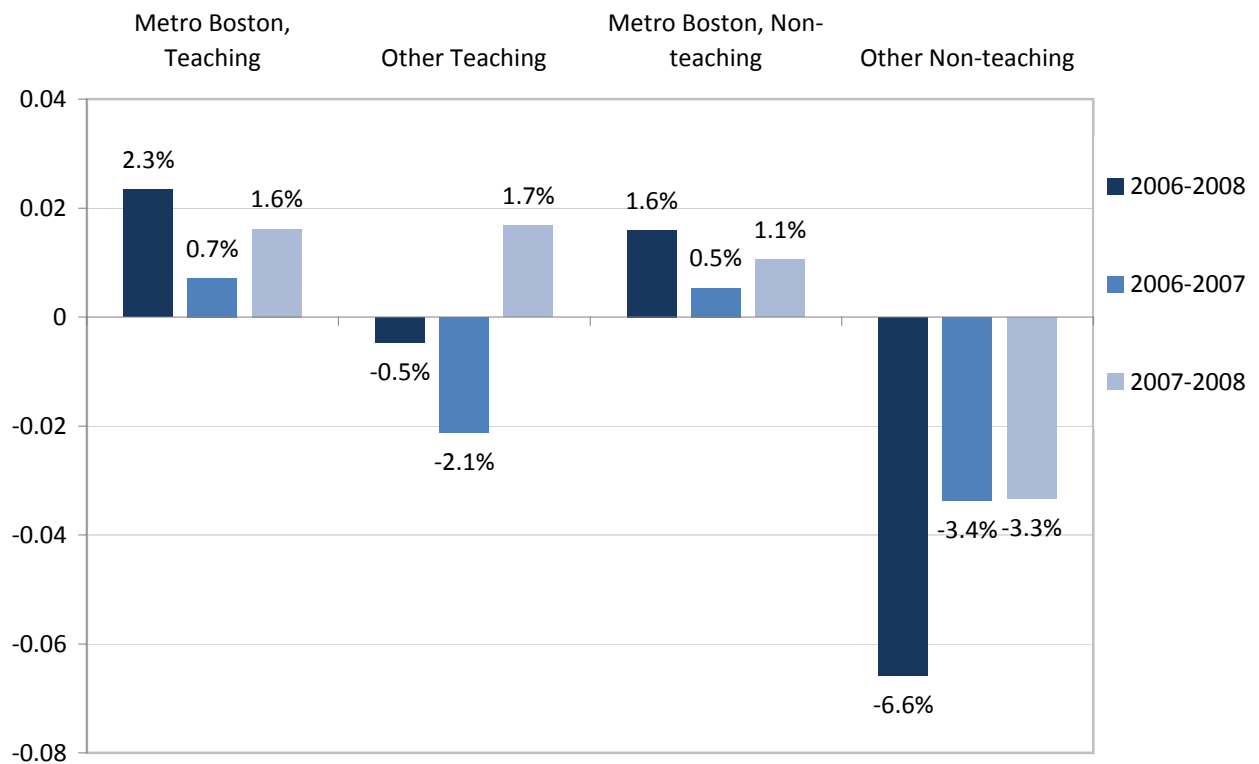
**Figure B.8: Percent Change in Total Spending for Privately Insured Inpatient Care  
by Hospital Teaching Status and Location, 2006-2008**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data only include facility charges for care provided at acute inpatient facilities. Expenditures for out-of-state hospitals are excluded, as are expenditures for a small number of in-state facilities for which either location or teaching status was unidentified. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.

**Figure B.9: Percent Change in Number of Admissions per Thousand Member Years for Privately Insured Inpatient Care by Hospital Type and Metro Boston Location, 2006-2008**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include facility charges only for care provided at acute inpatient facilities. Out-of-state hospitals are excluded. A small number of in-state facilities are omitted, for which either location or teaching status was unidentified. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data. The number of admissions was adjusted for missing data in 2007 and 2008; see methods appendix for details.

**Table B.4: Components of Change in Spending per Member Year for Privately Insured Hospital Inpatient Care by Hospital Teaching Status and Metro Boston Location, 2006-2008**

	Inpatient Spending per Member Year	Spending per Admission	Admissions per 1,000 Member Years	Number of Days per Admission	Spending per Inpatient Day
<b>Teaching hospitals</b>					
2008	\$465	\$14,977	31.05	4.42	\$3,386
Percent change 2006-2008	18.0%	16.0%	1.7%	0.0%	16.0%
2006-2007	8.5%	8.4%	0.1%	-0.6%	9.0%
2007-2008	8.8%	7.0%	1.6%	0.6%	6.4%
<b>Metro Boston teaching hospitals</b>					
2008	\$379	\$15,573	24.33	4.47	\$3,487
Percent change 2006-2008	17.1%	14.5%	2.3%	-1.3%	15.9%
2006-2007	9.0%	8.3%	0.7%	-0.9%	9.3%
2007-2008	7.4%	5.7%	1.6%	-0.4%	6.1%
<b>Other teaching hospitals</b>					
2008	\$86	\$12,820	6.72	4.27	\$3,001
Percent change 2006-2008	21.9%	22.5%	-0.5%	5.0%	16.6%
2006-2007	5.8%	8.1%	-2.1%	0.6%	7.5%
2007-2008	15.2%	13.3%	1.7%	4.4%	8.5%
<b>Non-teaching hospitals</b>					
2008	\$261	\$7,940	32.84	3.59	\$2,211
Percent change 2006-2008	16.7%	20.4%	-3.1%	-0.9%	21.6%
2006-2007	9.1%	11.0%	-1.7%	-0.8%	11.9%
2007-2008	6.9%	8.5%	-1.4%	-0.1%	8.6%
<b>Metro Boston non-teaching hospitals</b>					
2008	\$126	\$8,626	14.56	3.69	\$2,336
Percent change 2006-2008	21.7%	19.8%	1.6%	-1.6%	21.8%
2006-2007	11.1%	10.5%	0.5%	-1.6%	12.2%
2007-2008	9.6%	8.5%	1.1%	0.0%	8.5%
<b>Other non-teaching hospitals</b>					
2008	\$135	\$7,394	18.28	3.51	\$2,106
Percent change 2006-2008	12.3%	20.3%	-6.6%	-0.6%	21.0%
2006-2007	7.4%	11.2%	-3.4%	-0.3%	11.5%
2007-2008	4.6%	8.2%	-3.3%	-0.3%	8.5%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data only include facility charges for care provided at acute inpatient facilities. United Health Care is excluded in the calculation of average length of stay because the discharge date is missing on the inpatient data file. Out-of-state hospitals, as well as a small number of in-state facilities whose location or teaching status could not be determined, are included in the total but excluded from the regional categories. Because total member months cannot be distributed based on members' location, total member months are used in all per member year calculations across regions. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data. The number of admissions and days were adjusted for missing data in 2007 and 2008; see methods appendix for details.

**Table B.5. Drivers of Change in Total Spending for Privately Insured Hospital Inpatient Care By Hospital Teaching Status, 2006-2007**

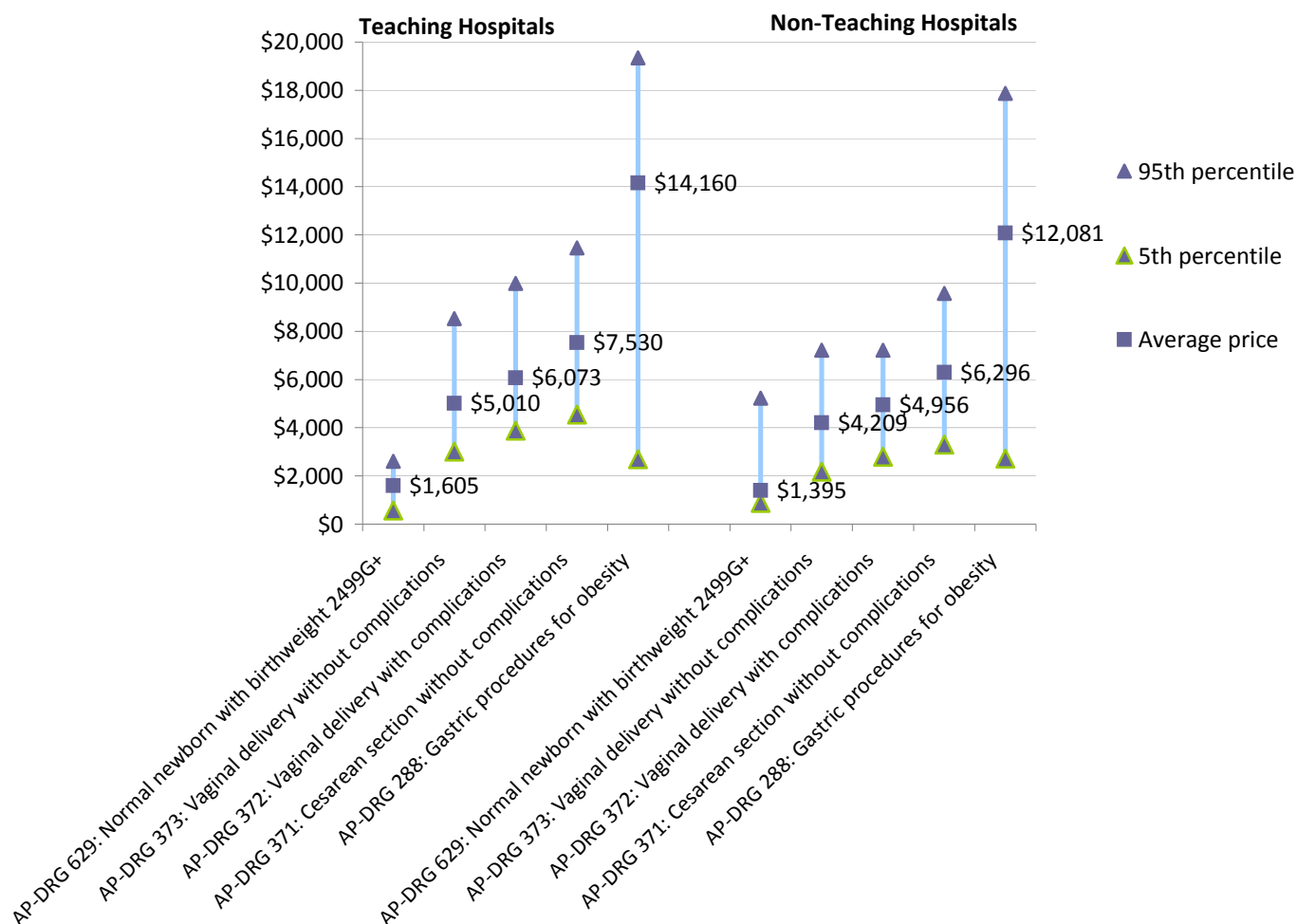
	Change in Total Spending	Change in total spending due to change in:		
		Price	Number of Admissions	Service Mix
<b>Teaching hospitals</b>				
2006 - 2007				
All market basket inpatient care (in millions)	\$81.5	\$84.1	\$3.6	-\$6.3
Percent of total change	100.0%	103.2%	4.5%	-7.7%
Contribution to total change (in percentage points)	8.5%	8.8%	0.4%	-0.7%
<b>Non-teaching hospitals</b>				
2006 - 2007				
All market basket inpatient care (in millions)	\$50.5	\$58.3	-\$12.5	\$4.8
Percent of total change	100.0%	115.3%	-24.8%	9.4%
Contribution to total change (in percentage points)	8.5%	9.8%	-2.1%	0.8%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include only facility charges for care provided at acute inpatient facilities. The change in the number of admissions combines changes in the number of insured member years and the number of admissions per member year. Certain carriers and claims are excluded; see decomposition methods in the appendix for details.



**Figure III.B.10: Price Variation for Selected High-Frequency DRGs by Hospital Teaching Status, 2008**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Note: Data include facility charges only for care provided at acute inpatient facilities. Percentiles are calculated and compared by carrier, and only the highest 95th percentile and the lowest 5th percentile are presented, together with average price across all carriers.

**Table C.1: Distribution of Outpatient Spending by Type of Service and Facility Type, 2008 (\$ millions)**

	Total		Hospitals		Free-Standing Facilities	
	Spending	Percent of Total Spending	Spending	Percent of Total Spending	Spending	Percent of Total Spending
All outpatient services	\$3,307.3	100.0%	\$3,052.2	100.0%	\$255.1	100.0%
Procedures	1,024.8	31.0%	838.4	27.5%	186.4	73.1%
Imaging	783.0	23.7%	773.5	25.3%	9.5	3.7%
Evaluation and management	354.0	10.7%	341.7	11.2%	12.2	4.8%
All other	1,145.6	34.6%	1,098.5	36.0%	47.0	18.4%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include only facility charges for outpatient care. Type of service is categorized with the BETOS grouper, using the CPT procedure codes on each claim. Lab and other tests, durable medical equipment, other outpatient services, and claims without a CPT code are included in the "all other" row. Ambulatory care centers, urgent care facilities, independent clinics, birthing centers, and comprehensive outpatient rehab facilities are included in the "free-standing facilities" category. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustment and other payments that are not captured in the claims data.

**Table C.2: Annual Growth in Spending for Privately Insured Outpatient Care by Type of Facility, 2006-2008**

	Total outpatient spending (\$ millions)			Percent change		
	2006	2007	2008	2006-2008	2006-2007	2007-2008
Total	\$2,711.7	\$2,976.7	\$3,307.3	22.0%	9.8%	11.1%
Hospitals	2,415.1	2,701.2	3,052.2	26.4%	11.8%	13.0%
Free-standing facilities	296.7	275.4	255.1	-14.0%	-7.2%	-7.4%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include only facility charges for outpatient care. Emergency room and all other outpatient hospital visits are included in the "hospitals" category. Ambulatory care centers, urgent care facilities, independent clinics, birthing centers, and comprehensive outpatient rehab facilities are included in the "free-standing facilities" category. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustment and other payments that are not captured in the claims data.

**Table C.3: Change in Spending for Privately Insured Outpatient Services and Percent of Change by Type of Service, 2006-2008**

	Total		Hospitals		Free-Standing Facilities	
	Change in spending 2006-2008 (\$ millions)	Percent of change	Change in spending 2006-2008 (\$ millions)	Percent of change	Change in spending 2006-2008 (\$ millions)	Percent of change
All outpatient services	\$595.6	100.0%	\$637.1	100.0%	-\$41.6	100.0%
Procedures	\$200.4	33.6%	\$217.4	34.1%	-\$17.0	40.8%
Imaging	\$165.6	27.8%	\$166.6	26.1%	-\$1.0	2.5%
Evaluation and management	\$62.4	10.5%	\$67.9	10.7%	-\$5.5	13.2%
Other	\$167.2	28.1%	\$185.3	29.1%	-\$18.1	43.5%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include only facility charges for outpatient care. Type of service is categorized with the BETOS grouper, using the CPT procedure codes on each claim. Lab and other tests, durable medical equipment, other outpatient services, and claims without a CPT code are included in the "all other" row. Ambulatory care centers, urgent care facilities, independent clinics, birthing centers, and comprehensive outpatient rehab facilities are included in the "free-standing facilities" category. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustment and other payments that are not captured in the claims data.

**Table C.4: Spending Per Member Year for Privately Insured Outpatient Services by Insurance Market Sector, 2006-2008**

	All plans	Fully-insured				Self-insured plans
		Individuals	Small groups	Medium-sized groups	Large groups	
2006	\$920	\$1,308	\$892	\$841	\$904	\$969
2007	\$1,010	\$1,436	\$970	\$931	\$1,000	\$1,058
2008	\$1,128	\$1,428	\$1,080	\$1,029	\$1,124	\$1,185
Percent change, 2006-2008	22.7%	9.2%	21.1%	22.4%	24.3%	22.4%
2006-2007	9.8%	9.8%	8.7%	10.7%	10.7%	9.2%
2007-2008	11.8%	-0.6%	11.4%	10.6%	12.3%	12.1%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include only facility charges for outpatient care. Emergency room and all other outpatient hospital visits are included in the "hospitals" category. Ambulatory care centers, urgent care facilities, independent clinics, birthing centers, and comprehensive outpatient rehab facilities are included in the "free-standing facilities" category. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustment and other payments that are not captured in the claims data.

**Table C.5: Factors Contributing to Change in Total Spending per Member Year for Privately Insured Outpatient Care by Type of Facility, 2006-2008**

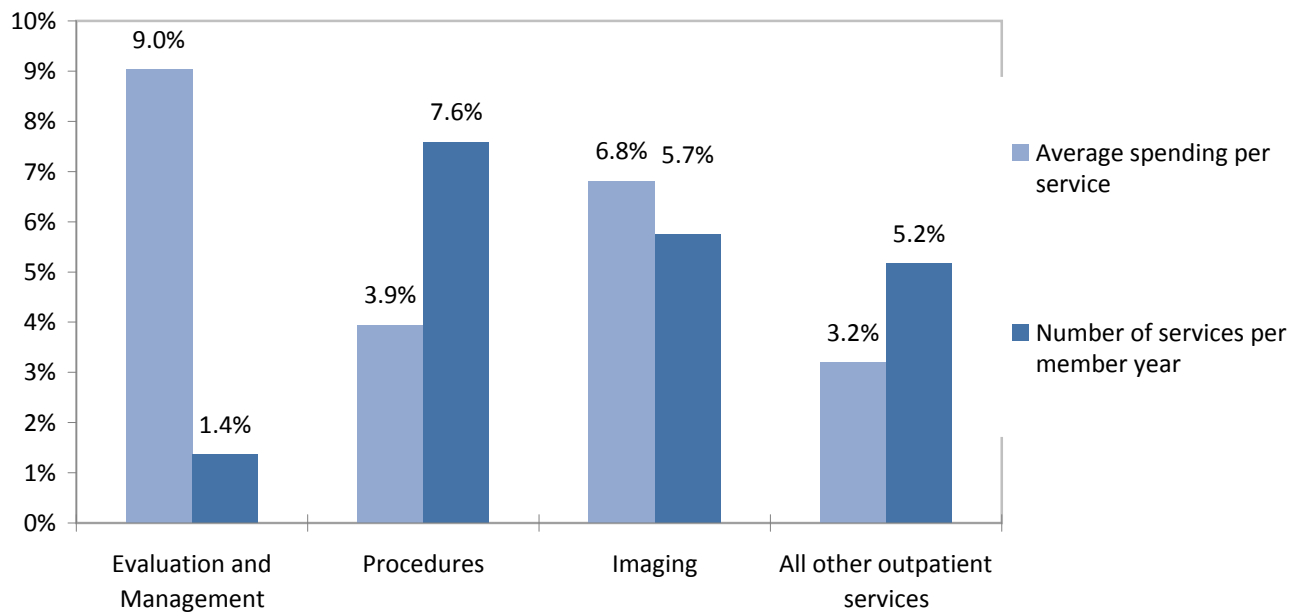
	Spending per Member Year	Average Spending per Service <sup>a</sup>	Number of Services per Member Year
<b>All Outpatient Services</b>			
2008	\$1,128	\$128	8.84
Percent change 2006-2008	22.7%	11.2%	10.3%
2006-2007	9.8%	6.2%	3.4%
2007-2008	11.8%	4.7%	6.7%
<b>All Hospital Outpatient</b>			
2008	\$1,041	\$123	8.48
Percent change 2006-2008	27.1%	13.2%	12.3%
2006-2007	11.9%	7.5%	4.1%
2007-2008	13.7%	5.3%	7.9%
<b>All Free-Standing Facility Outpatient</b>			
2008	\$87	\$241	0.36
Percent change 2006-2008	-13.5%	8.0%	-21.8%
2006-2007	-7.2%	0.1%	-8.1%
2007-2008	-6.8%	8.0%	-14.9%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include only facility charges for outpatient care. Emergency room and all other outpatient hospital visits are included in the "hospitals" category. Ambulatory care centers, urgent care facilities, independent clinics, birthing centers, and comprehensive outpatient rehab facilities are included in the "free-standing facilities" category. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustment and other payments that are not captured in the claims data.

<sup>a</sup> Services are defined at the claims line level. Therefore, changes in the number of services per member month may reflect a change in the number of claims that are submitted to capture the same service units. Conversely, changes in the volume of service units included on a single claim are not reflected. (For example, injectable drugs are often billed on a single claim where the number of service units corresponds to the amount of drug administered.) Consequently, a change in the average expenditure per service may reflect changes in the price per service unit, changes in the number of service units per claim line, or a change in the mix of services provided.

**Figure III.C.1: Average Annual Percent Change in Spending per Privately Insured Outpatient Service and Number of Outpatient Services per Member Year by Major Type of Service, 2006-2008**

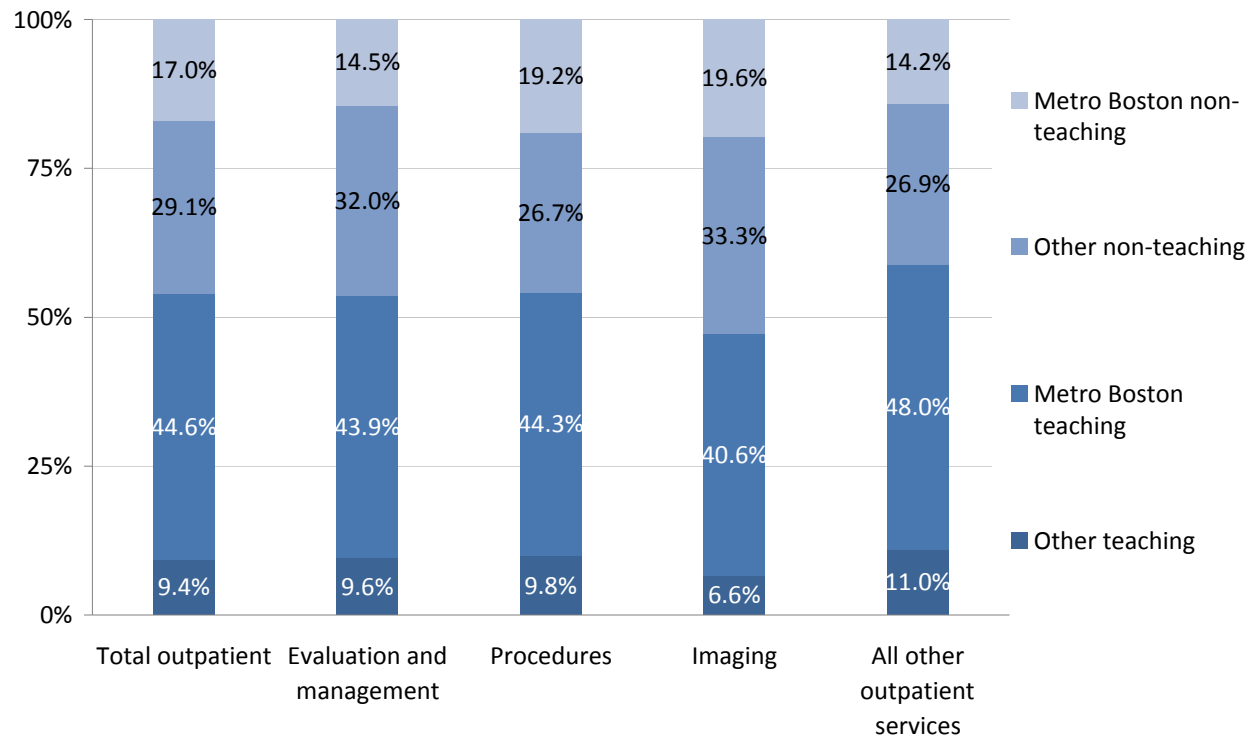


Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include only facility charges for outpatient care provided at hospitals and free-standing facilities. Type of service is classified with the BETOS grouper, using the CPT procedure code on each claim. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustment and other payments that are not captured in the claims data. Services are defined at the claims line level. Therefore, changes in the number of services per member year may reflect a change in the number of claims that are submitted to capture the same service units. Conversely, changes in the volume of service units included on a single claim are not reflected. (For example, injectable drugs are often billed on a single claim where the number of service units corresponds to the amount of drug administered.) Consequently, a change in the average expenditure per service may reflect changes in the price per service unit, changes in the number of service units per claim line, or a change in the mix of services provided.



**Figure C.2: Distribution of Spending for Major Types of Privately Insured Hospital Outpatient Services, by Hospital Teaching Status and Metro Boston Location, 2008**

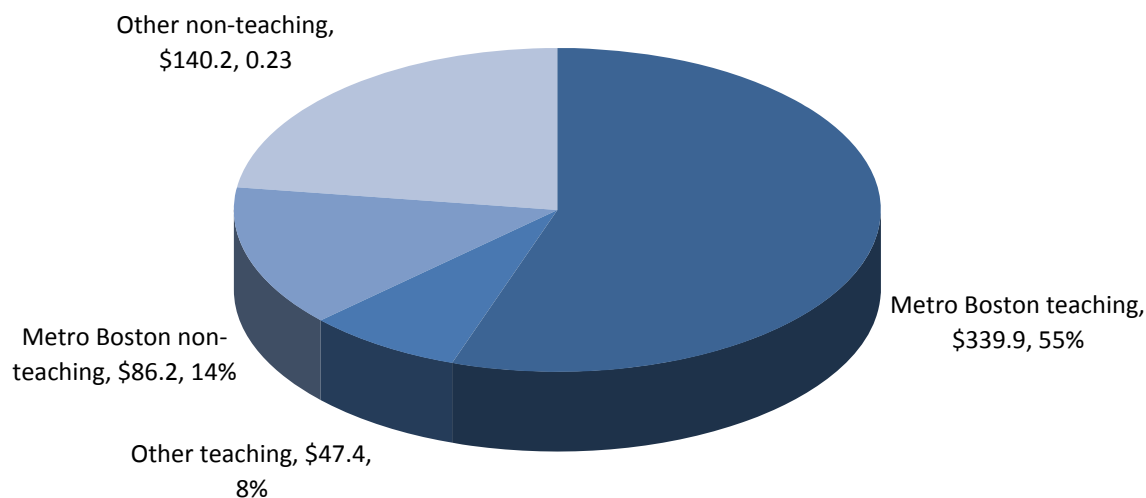


Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Expenditures for hospital outpatient departments include only facility charges. Expenditures for out-of-state hospitals are excluded, as are expenditures for a small number of in-state facilities for which either location or teaching status was unidentified. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustment and other payments that are not captured in the claims data.

**Figure C.3: Distribution of the Change in Total Spending for Hospital Outpatient Care by Hospital Type and Metro Boston Location, 2006-2008 (\$ millions)**

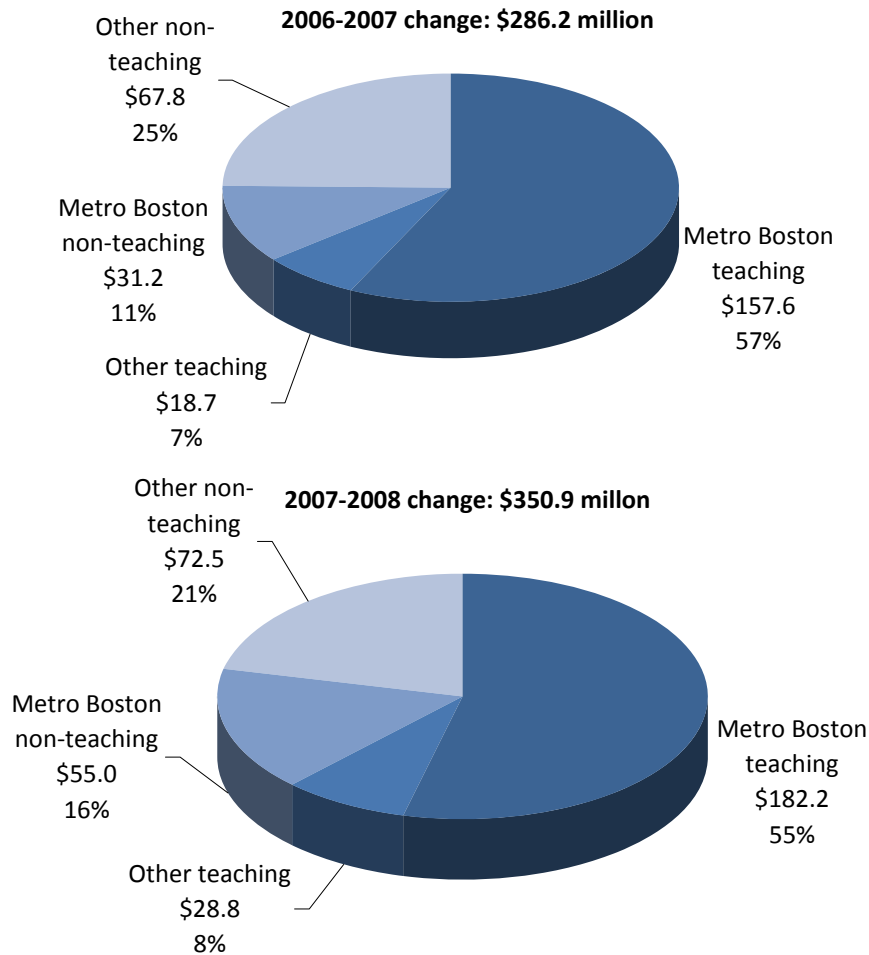
**2006-2008 change in spending for hospital outpatient care: \$637.1 million**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include only facility charges for care provided at outpatient hospital facilities. Expenditures for out-of-state hospitals and for a small number of in-state facilities for which either location or teaching status was unidentified are not displayed. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustment and other payments that are not captured in the claims data.

**Figure C.3a: Distribution of the Change in Total Expenditures for Hospital Outpatient Care by Hospital Type and Boston Location, 2006-2008 (\$ millions)**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include only facility charges for care provided at outpatient hospital facilities.

Expenditures for out-of-state hospitals and for a small number of in-state facilities for which either location or teaching status was unidentified are not displayed. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustment and other payments that are not captured in the claims data.

**Table C.6: Factors Contributing to Change in Total Spending per Member Year for Privately Insured Hospital Outpatient Care by Metro Boston Location and Teaching Status, 2006-2008**

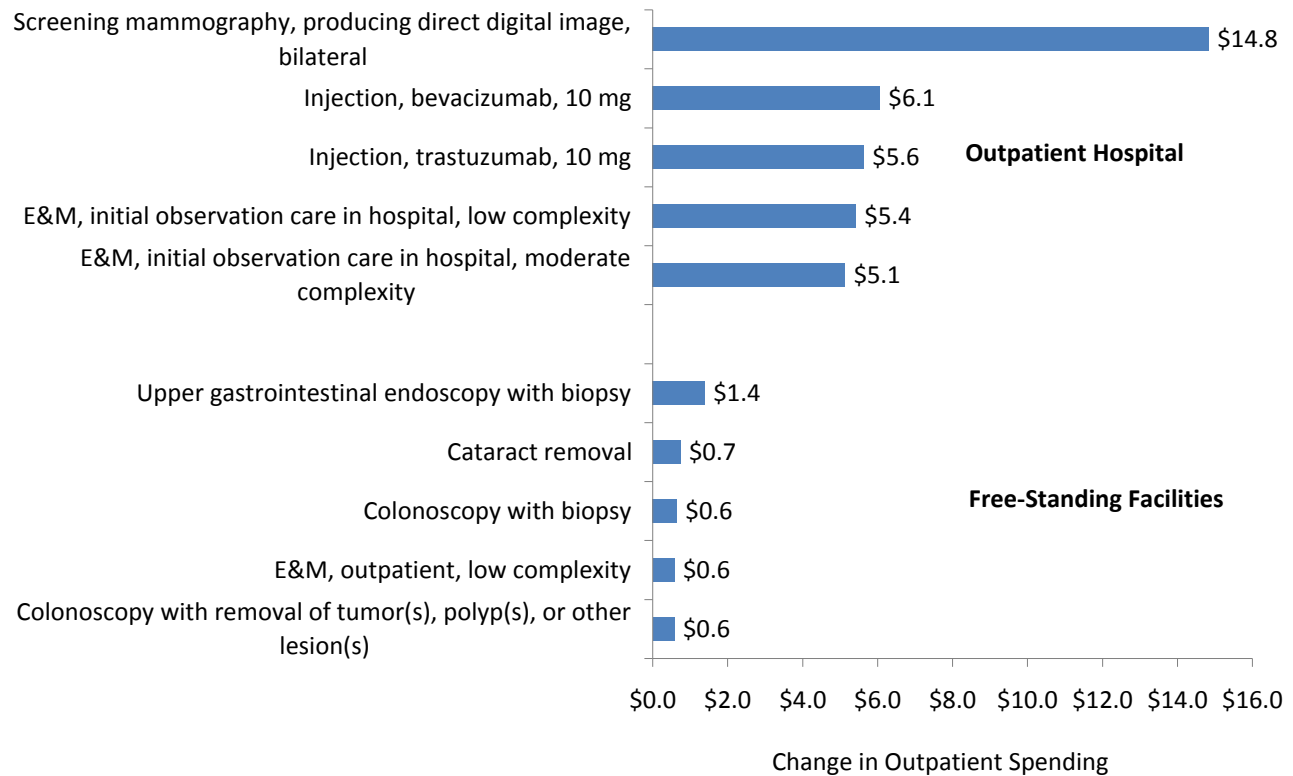
	Spending per Member Year	Average Spending per Service <sup>a</sup>	Number of Services per Member Year
<b>Total hospital outpatient services</b>			
2008	\$1,041	\$123	8.5
Percent change 2006-2008	27.1%	13.2%	12.3%
2006-2007	11.9%	7.5%	4.1%
2007-2008	13.7%	5.3%	7.9%
<b>Metro Boston teaching hospitals</b>			
2008	\$446	\$156	2.9
Percent change 2006-2008	35.9%	20.6%	12.8%
2006-2007	16.3%	10.9%	4.8%
2007-2008	16.9%	8.7%	7.6%
<b>Metro Boston non-teaching hospitals</b>			
2008	\$170	\$106	1.6
Percent change 2006-2008	21.7%	9.4%	11.2%
2006-2007	7.6%	6.1%	1.4%
2007-2008	13.1%	3.1%	9.7%
<b>Other Teaching Hospitals</b>			
2008	\$94	\$111	0.8
Percent change 2006-2008	21.6%	6.4%	14.4%
2006-2007	8.2%	2.1%	6.0%
2007-2008	12.4%	4.2%	7.9%
<b>Other Non-Teaching Hospitals</b>			
2008	\$290	\$99	0.24
Percent change 2006-2008	20.4%	7.3%	12.2%
2006-2007	9.5%	5.1%	4.2%
2007-2008	9.9%	2.1%	7.7%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include only facility charges for outpatient care. Emergency room and all other outpatient hospital visits are included in the "hospitals" category. Ambulatory care centers, urgent care facilities, independent clinics, birthing centers, and comprehensive outpatient rehab facilities are included in the "free-standing facilities" category. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustment and other payments that are not captured in the claims data. Spending details may not add to totals due to payments to hospitals outside Massachusetts.

<sup>a</sup> Services are defined at the claims line level. Therefore, changes in the number of services per member month may reflect a change in the number of claims that are submitted to capture the same service units. Conversely, changes in the volume of service units included on a single claim are not reflected. (For example, injectable drugs are often billed on a single claim where the number of service units corresponds to the amount of drug administered.) Consequently, a change in the average expenditure per service may reflect changes in the price per service unit, changes in the number of service units per claim line, or a change in the mix of services provided.

**Figure C.4: Selected Services Accounting for Largest Growth in Total Spending for Privately Insured Outpatient Services by Type of Facility, 2007-2008 (\$ millions)**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include facility charges only for outpatient care. Certain claims (representing 20 percent of total outpatient expenditures in 2008) are excluded. See the methods appendix for details.

**Table C.7. Drivers of Change in Total Spending for Privately Insured Outpatient Services, 2006-2007**

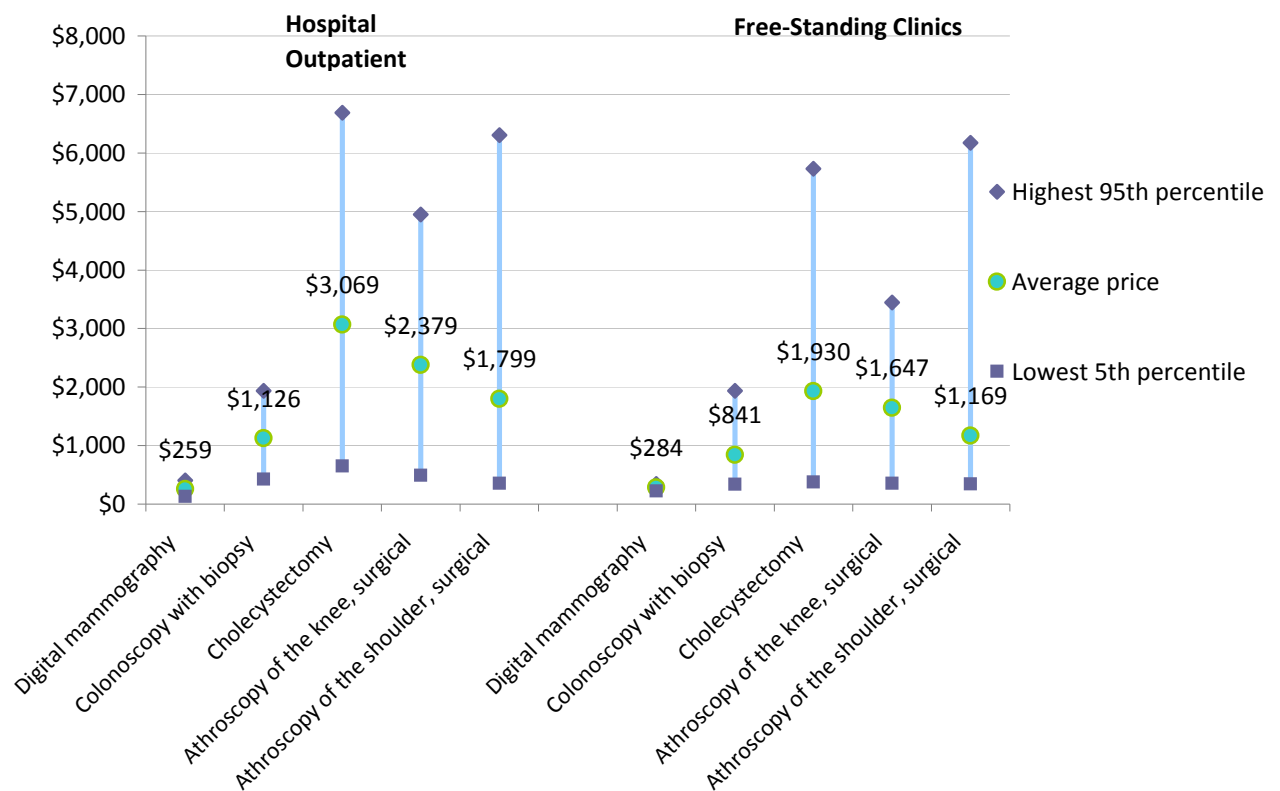
	Change in Spending	Change in spending due to the change in:		
		Price	Number of Service Units <sup>a</sup>	Service Mix
All market basket outpatient services (\$ millions)	\$267.2	\$146.3	\$160.8	-\$39.9
Percent of total change, all market basket outpatient services	100.0%	54.8%	60.2%	-14.9%
Contribution to total change (in percentage points)	12.1%	6.6%	7.3%	-1.8%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include only facility charges for outpatient care. Certain claims are excluded; see the methods appendix for details.

<sup>a</sup> The number of service units corresponds to the number of times the service or procedure billed for was performed; one claim may include multiple service units. (For example, injectable drugs are often billed on a single claim where the number of service units corresponds to the amount of drug administered.) A change in the number of service units may reflect change in the number of insured member years as well as the number of service units per member year.

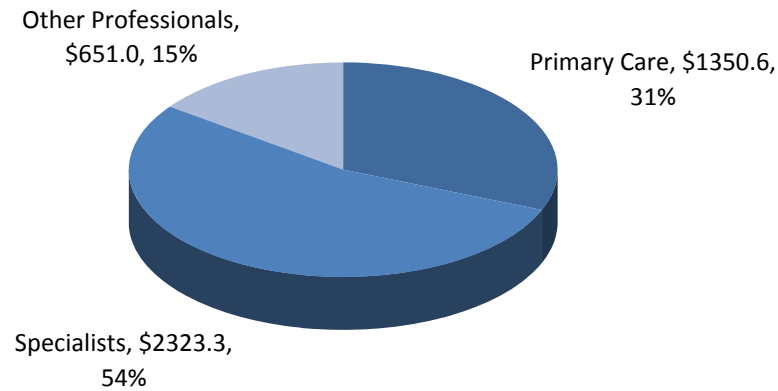
**Figure III.C.5: Price Variation for Selected Outpatient Services in Hospitals and Free-Standing Clinics, 2008**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: CPT codes are used for grouping the procedures. Data include only facility charges. Percentiles are calculated and compared by carrier; the highest 95th percentile and the lowest 5th percentile are presented, together with average price across all carriers. Emergency room and all other outpatient hospital visits are included in the "hospitals" category. Ambulatory care centers, urgent care facilities, independent clinics, birthing centers, and comprehensive outpatient rehab facilities are included in the "free-standing facilities" category.

**Figure D.1: Total Spending for Privately Insured Physician and Other Professional Services  
by Type of Provider, 2008 (\$ millions)**

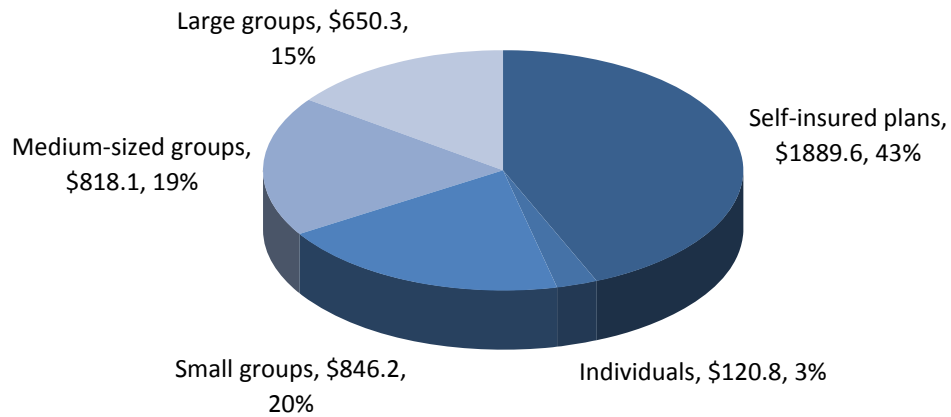


Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include professional charges only. Primary care includes general practitioners, family practitioners, internists, OB/GYNs, pediatricians, geriatricians, as well as physicians classified as practicing public health and general preventive medicine and adolescent medicine, and nurse practitioners. Specialists includes all other MDs. Other professionals include all other nurses, midwives, podiatrists, therapists, psychologists, chiropractors, dentists, nutritionists, dentists, etc., as well as professional charges where the provider type is unknown. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments not captured in the claims data.



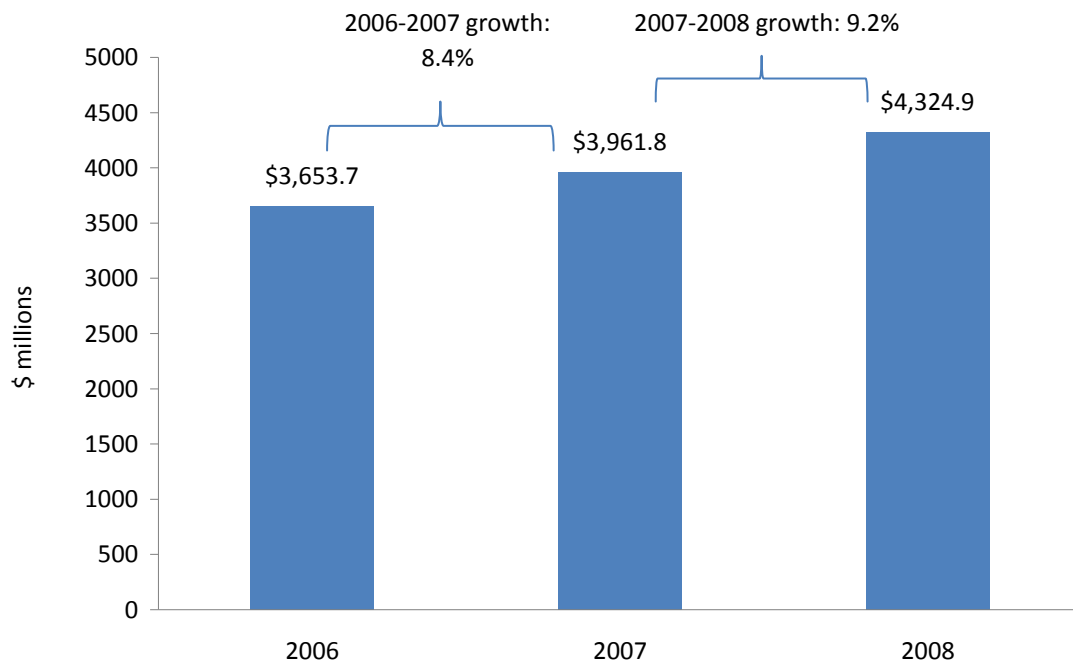
**Figure D.2: Total Spending for Privately Insured Physician and Other Professional Services  
by Insurance Market Sector, 2008 (\$ millions)**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include professional charges only. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments not captured in the claims data.

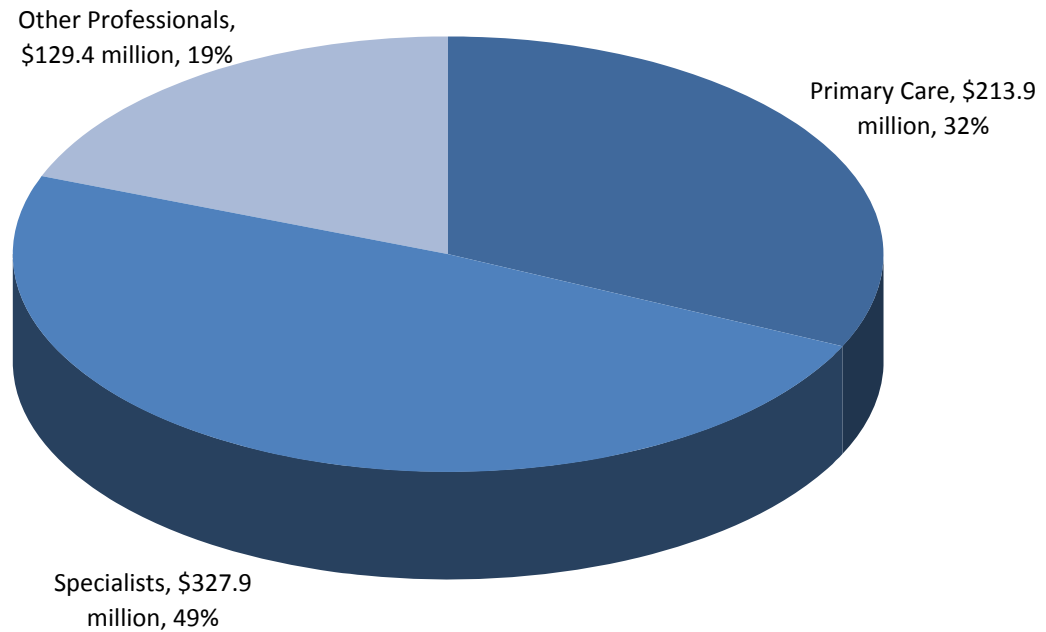
**Figure D.3. Total Spending for Physician and Other Professional Services and Annual Percent Change, 2006-2008**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts. Notes: Data include professional charges only. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments not captured in the claims data.

**Figure D.4: Change in Total Spending for Privately Insured Physician and Other Professional Services  
by Type of Provider, 2006-2008**

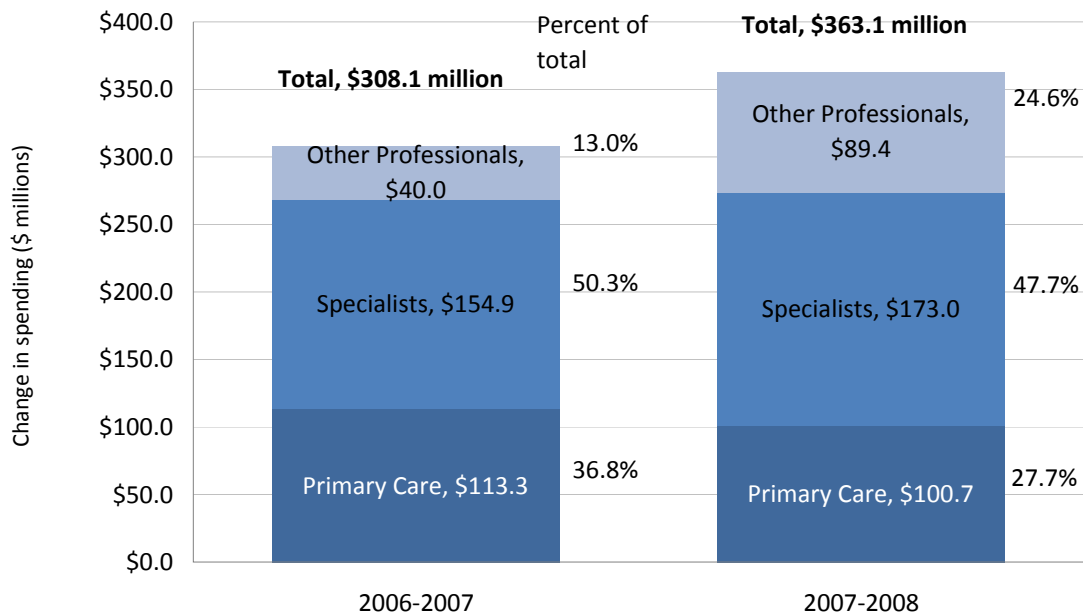
**Total change in spending for physician and other professional services: \$671.2 million**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include professional charges only. Primary care includes general practitioners, family practitioners, internists, OB/GYNs, pediatricians, geriatricians, as well as physicians classified as practicing public health and general preventive medicine and adolescent medicine, and nurse practitioners. Specialists includes all other MDs. Other professionals include all other nurses, midwives, podiatrists, therapists, psychologists, chiropractors, dentists, nutritionists, dentists, etc., as well as professional charges where the provider type is unknown. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.

**Figure D.4.a: Annual Change in Total Spending for Privately Insured Physician and Other Professional Services  
by Type of Provider, 2006-2008 (\$ millions)**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include professional charges only. Primary care includes general practitioners, family practitioners, internists, OB/GYNs, pediatricians, geriatricians, as well as physicians classified as practicing public health and general preventive medicine and adolescent medicine, and nurse practitioners. Specialists includes all other MDs. Other professionals include all other nurses, midwives, podiatrists, therapists, psychologists, chiropractors, dentists, nutritionists, dentists, etc., as well as professional charges where the provider type is unknown. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.

**Table D.1: Spending per Member Year for Privately Insured Physician and Other Professional Services by Insurance Market Sector, 2006-2008**

	All plans	Fully-insured				Self-insured plans
		Individuals	Small groups	Medium-sized groups	Large groups	
2006	\$1,239	\$1,567	\$1,198	\$1,166	\$1,230	\$1,292
2007	\$1,344	\$1,668	\$1,295	\$1,263	\$1,341	\$1,399
2008	\$1,475	\$1,716	\$1,397	\$1,368	\$1,474	\$1,554
Percent change 2006-2008	19.1%	9.5%	16.6%	17.3%	19.8%	20.3%
2006-2007	8.4%	6.4%	8.1%	8.3%	9.0%	8.3%
2007-2008	9.8%	2.9%	7.9%	8.3%	10.0%	11.0%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments not captured in the claims data.

**Table D.2: Components of Change in Spending per Member Year for Privately Insured Physician and Other Professional Services by Type of Service, 2006-2008**

	Spending for Physician and Other Professional Services per Member Year	Average Spending per Service	Number of Services per Member Year
<b>Total Professional services</b>			
2008	\$1,475	\$99	15.0
Percent change, 2006-2008	19.1%	9.8%	8.5%
2006-2007	8.4%	4.7%	3.6%
2007-2008	9.8%	4.8%	4.8%
<b>Primary Care</b>			
2008	\$461	\$80	5.8
Percent change, 2006-2008	19.5%	10.8%	7.9%
2006-2007	10.0%	5.7%	4.0%
2007-2008	8.7%	4.8%	3.7%
<b>Specialty</b>			
2008	\$793	\$142	11.5
Percent change, 2006-2008	17.1%	9.8%	6.6%
2006-2007	7.8%	5.2%	2.4%
2007-2008	8.7%	4.4%	4.1%
<b>Other Professionals</b>			
2008	\$222	\$61	3.6
Percent change, 2006-2008	25.6%	11.8%	12.3%
2006-2007	7.7%	3.0%	4.5%
2007-2008	16.6%	8.5%	7.5%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Primary care includes general practitioners, family practitioners, internists, OB/GYNs, pediatricians, geriatricians, as well as physicians classified as practicing public health and general preventive medicine and adolescent medicine, and nurse practitioners. Specialists includes all other MDs. Other professionals include all other nurses, midwives, podiatrists, therapists, psychologists, chiropractors, dentists, nutritionists, dentists, etc., as well as professional claims where the provider type is unknown. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data. Since services are defined at the claims line level, the number of services per member month does not capture changes in the volume of service units included on a single claim. (Injectable drugs, among other services, are often billed on a single claim where the number of service units corresponds to the amount of drug administered.) As a result, increases in the average expenditure per service may capture increases in the price per service unit, increases in the number of service units per claim line, or a change in the mix of services provided.

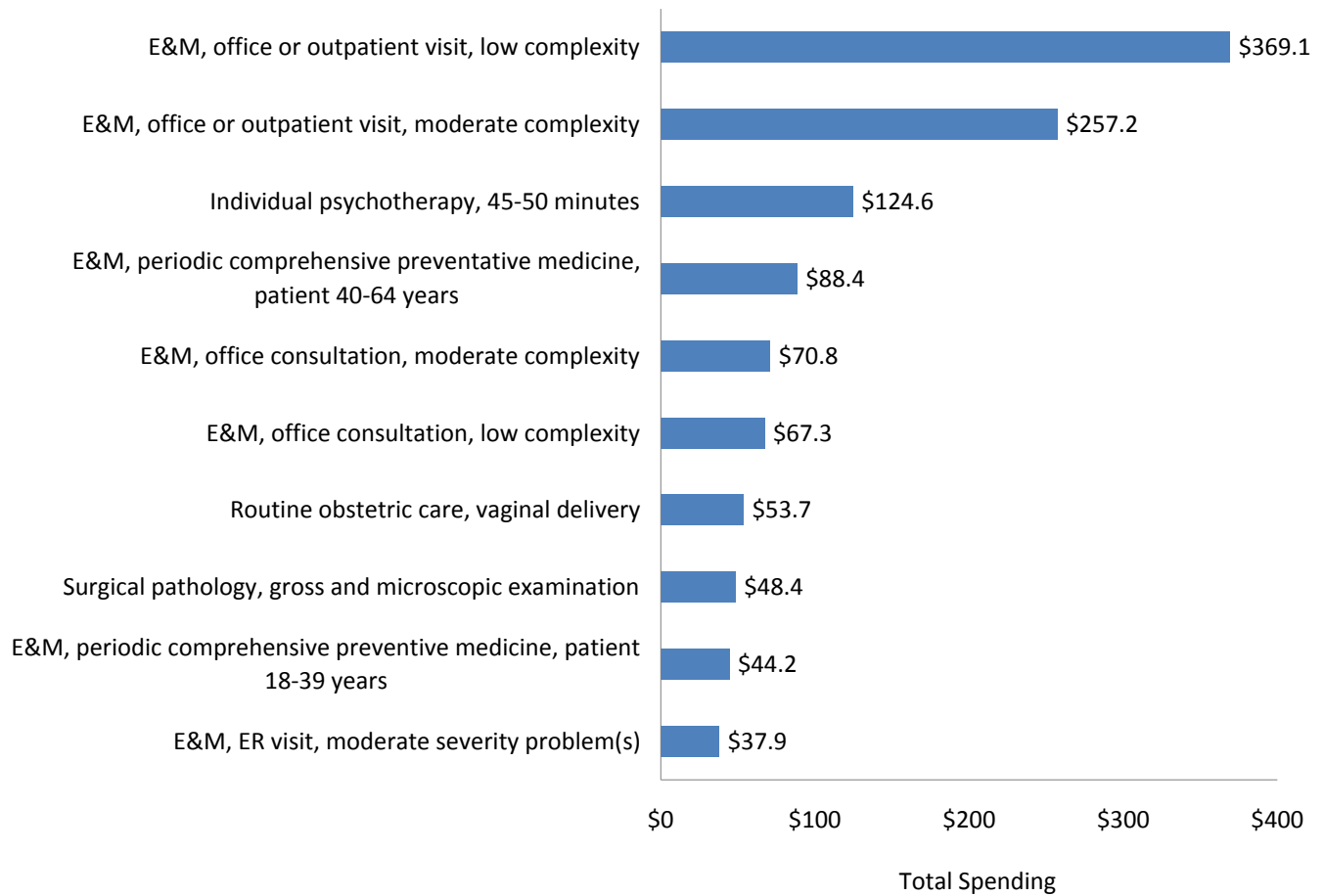
**Table D.3: Components of Change in Spending per Member Year for Privately Insured Physician and Other Professional Services by Insurance Market Sector, 2006-2008**

	Spending for Physician and Other Professional Services per Member Year	Average Spending per Service	Number of Services per Member Year
<b>Fully-insured plans</b>			
Individuals			
2008	\$1,716	\$103	16.6
Percent change, 2006-2008	9.5%	8.4%	1.0%
2006-2007	6.4%	3.7%	2.6%
2007-2008	2.9%	4.5%	-1.6%
Small groups			
2008	\$1,397	\$96	14.5
Percent change, 2006-2008	16.6%	9.5%	6.4%
2006-2007	8.1%	5.0%	2.9%
2007-2008	7.9%	4.3%	3.4%
Medium-sized groups			
2008	\$1,368	\$96	14.2
Percent change, 2006-2008	17.3%	9.2%	7.4%
2006-2007	8.3%	4.6%	3.5%
2007-2008	8.3%	4.3%	3.8%
Large groups			
2008	\$1,474	\$96	15.3
Percent change, 2006-2008	19.8%	9.3%	9.7%
2006-2007	9.0%	4.6%	4.2%
2007-2008	10.0%	4.5%	5.3%
<b>Self-insured plans</b>			
2008	\$1,554	\$102	15.3
Percent change, 2006-2008	20.3%	9.9%	9.5%
2006-2007	8.3%	4.6%	3.6%
2007-2008	11.0%	5.0%	5.7%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data. Since services are defined at the claims line level, the number of services per member month does not capture changes in the volume of service units included on a single claim. (Injectable drugs, among other services, are often billed on a single claim where the number of service units corresponds to the amount of drug administered.) As a result, increases in the average expenditure per service may capture increases in the price per service unit, increases in the number of service units per claim line, or a change in the mix of services provided.

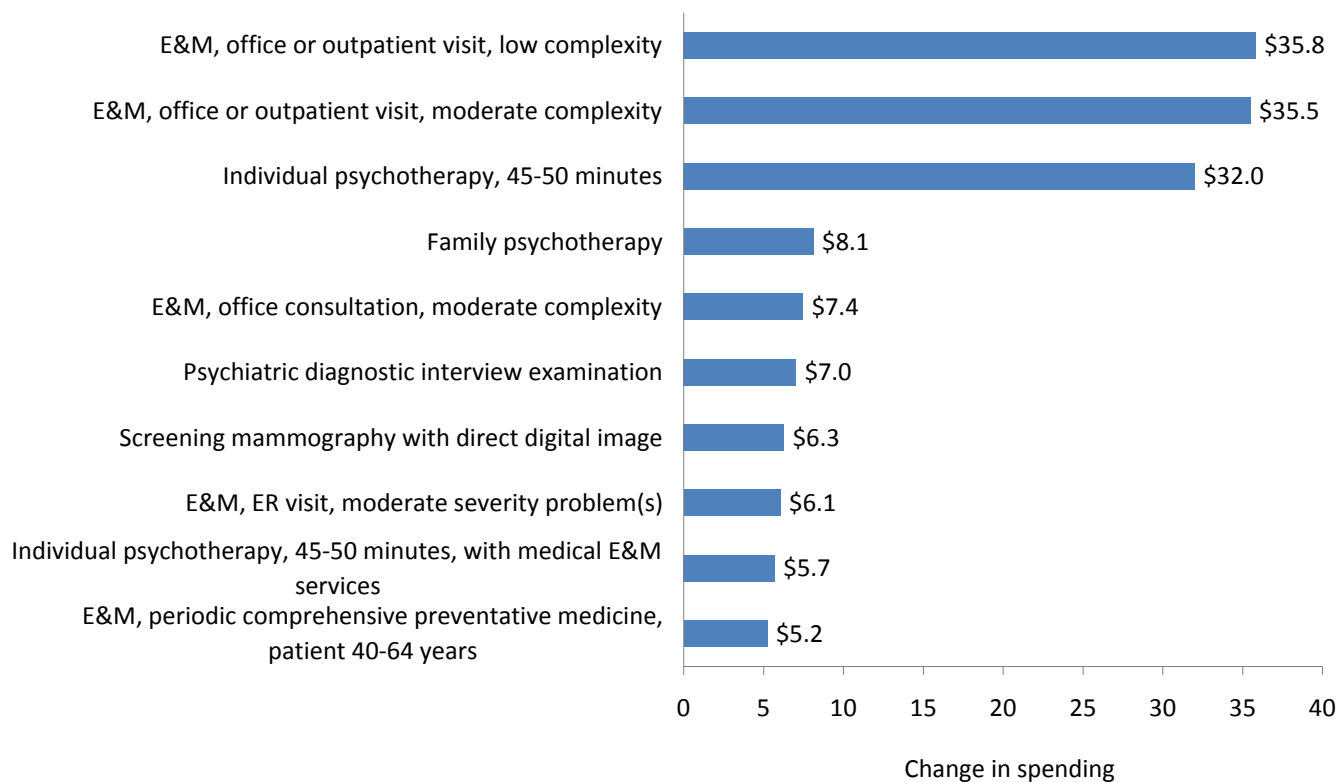
**Figure D.5: Selected Services Accounting for the Highest Total Spending for Privately Insured Professional Services, 2008 (\$ millions)**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts. Notes: Data include professional charges only. Certain claims (representing 14 percent of all professional claims in 2008) are excluded. See the methods appendix for details.



**Figure D.6: Selected Services Accounting for the Largest Growth in Spending for Privately Insured Physician and Other Professional Services, 2007-2008 (\$ millions)**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include professional charges only. Certain claims (representing 14 percent of all professional claims in 2008) are excluded. See the methods appendix for details.

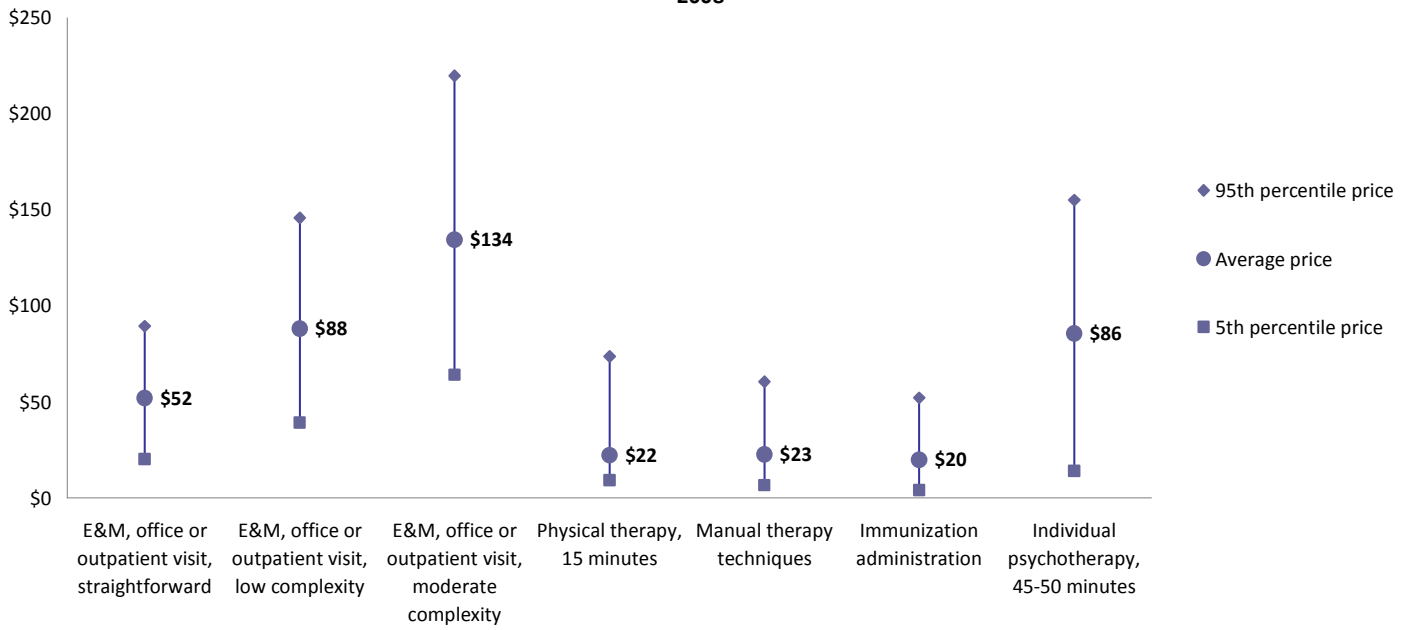
**Table D.4: Drivers of Change in Spending for Privately Insured Physician and Other Professional Services, 2006-2007**

	Change in Spending	Change in spending due to the change in:		
		Price	Number of Service Units	Service Mix
All market basket professional services (\$ millions)	\$253.8	\$279.5	\$61.7	-\$87.4
Percent of expenditure change	100.0%	110.1%	24.3%	-34.4%
Contribution to total change (in percentage points)	7.9%	8.7%	1.9%	-2.7%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

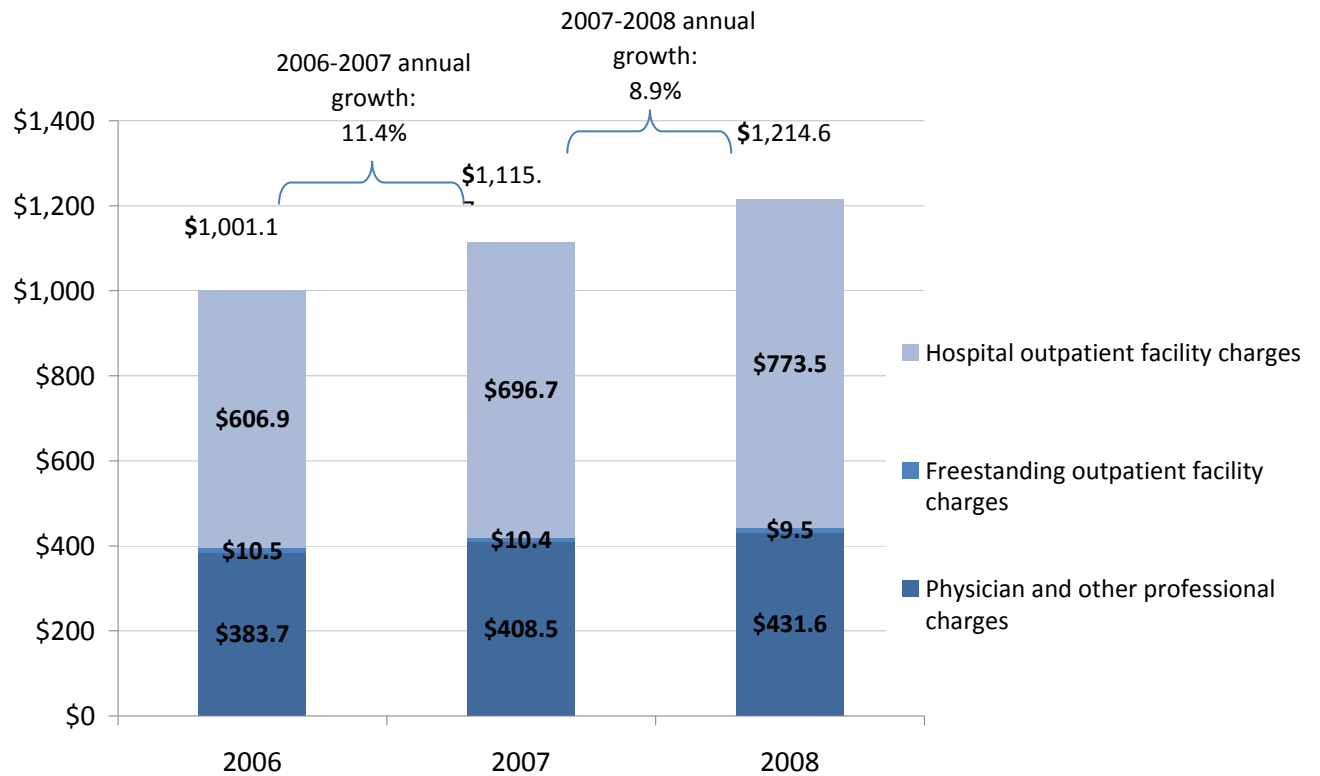
Notes: Data include physician and other professional charges in any location of service (inpatient, outpatient hospital, free-standing facilities, offices, clinics and all other locations). The number of service units on a claim corresponds to the number of times the service or procedure billed for was performed. The change in the number of service units combines change in the number of insured member months, change in number of services pmpm, and change in the number of service units per service. Using service units rather than services as a measure of volume controls for differences in the amount of care billed on a single claim. (Injectable drugs, among other services, are often billed on a single claim where the number of service units corresponds to the amount of drug administered.) Certain claims are excluded. See the methods appendix for details.

**Figure III.D.7: Price Variation for Selected High-Frequency Privately Insured Physician and Other Professional Services, 2008**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.  
 Notes: Data include professional charges only. See the methods appendix for details/

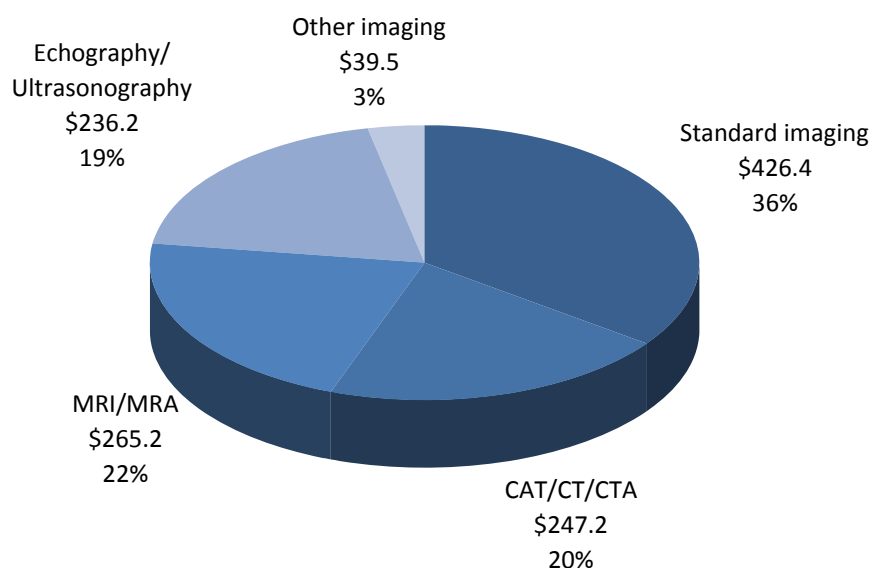
**Figure E.1: Total Spending for Privately Insured Imaging Services by Type of Provider, 2006-2008 (\$ millions)**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Spending excludes facility charges for imaging provided during an inpatient stay; inpatient imaging services are typically included in DRG payments and not billed separately. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.

**Figure E.2: Percent of Total Spending for Privately Insured Imaging Services  
by Type of Service, 2008 (\$ millions)**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest privatehealth insurance carriers in Massachusetts.

Notes: Spending includes payments for outpatient facilities and professional services. Facility charges for imaging provided during an inpatient stay are excluded; inpatient imaging services are typically included in DRG payments and not billed separately. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.

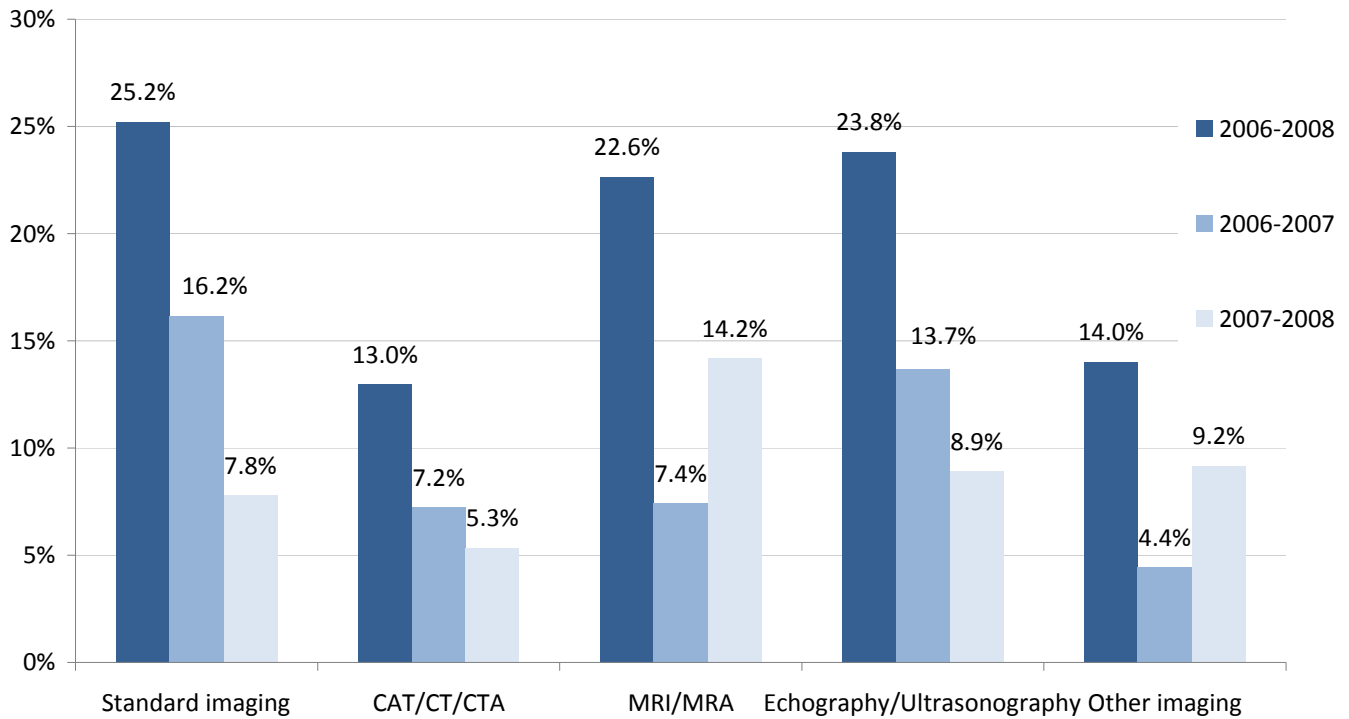
**Table E.1: Outpatient Facility Charges and Professional Services Charges as a Percent of Total Spending for Privately Insured Imaging, 2006-2008**

	Total spending for imaging services (\$ millions)	Outpatient Facility Charges		Physician and Other Professional Charges	
		Total spending (\$ millions)	Percent of total spending	Total spending (\$ millions)	Percent of total spending
2006	\$1,001.1	\$617.4	61.7%	\$383.7	38.3%
2007	\$1,115.7	\$707.1	63.4%	\$408.5	36.6%
2008	\$1,214.6	\$783.0	64.5%	\$431.6	35.5%
Percent change 2006-2008	21.3%	26.8%	na	12.5%	na
2006-2007	11.4%	14.5%	2.8%	6.5%	-4.5%
2007-2008	8.9%	10.7%	1.7%	5.7%	-2.9%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Outpatient facilities include hospitals and other freestanding outpatient facilities. Expenditures exclude facility charges for imaging provided during an inpatient stay; inpatient imaging services are typically included in DRG payments and not billed separately. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.

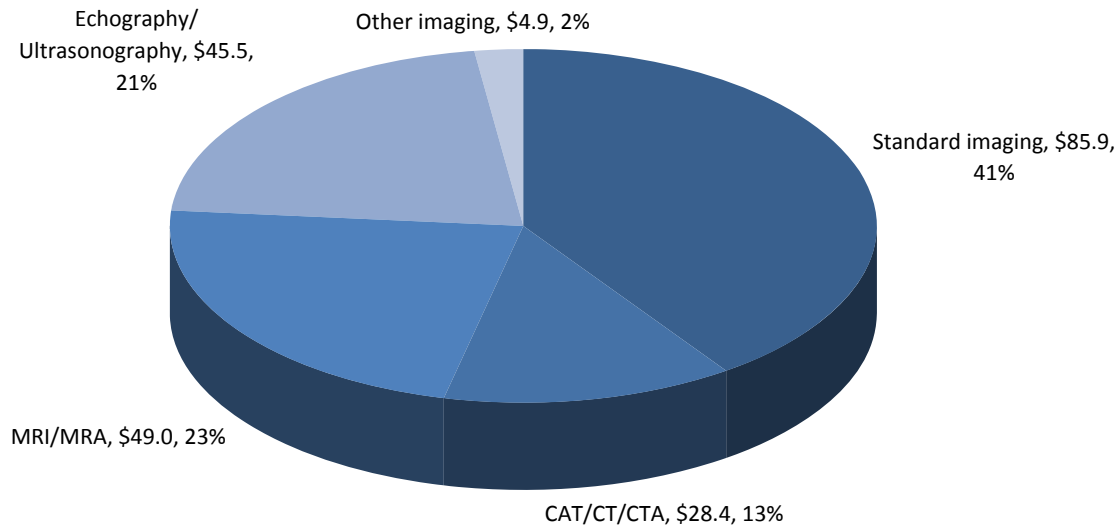
**Figure E.3: Annual Rates of Growth in Spending for Outpatient Imaging Services by Type of Service, 2006-2008**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Outpatient facilities include hospitals and other freestanding outpatient facilities. Spending exclude sfacility charges for imaging provided during an inpatient stay; imaging services are typically included in DRG payments and not billed separately. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.

**Figure E.4: Distribution of the Change in Total Spending for Privately Insured Imaging Services by Type of Service, 2006-2008**

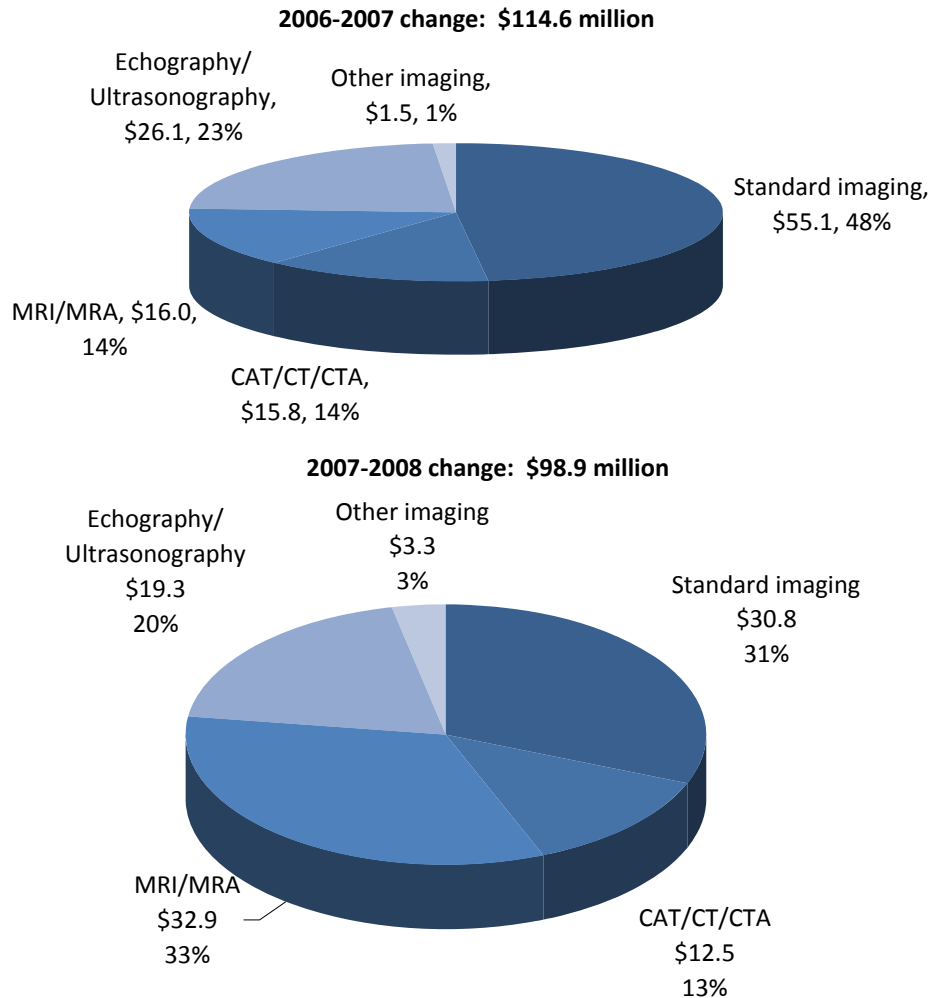


Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Outpatient facilities include hospitals and other freestanding outpatient facilities. Expenditures exclude facility charges for imaging provided during an inpatient stay; inpatient imaging services are typically included in DRG payments and not billed separately. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.



**Figure E.4a: Distribution of the Annual Change in Spending for Privately Insured Imaging Services by Type of Service, 2006-2008 (\$ millions)**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Outpatient facilities include hospitals and other freestanding outpatient facilities. Expenditures exclude facility charges for imaging provided during an inpatient stay; inpatient imaging services are typically included in DRG payments and not billed separately. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data.

**Table E.2: Components of Change in Outpatient Facility Charges per Member Year for Privately Insured Imaging Services by Type of Service, 2006-2008**

	Spending per Member Year	Spending per Service	Number of Services per Member Year
<b>All Imaging</b>			
2008	\$267	\$256	1.04
Percent change 2006-2008	27.6%	14.1%	11.8%
2006-2007	14.5%	7.3%	6.8%
2007-2008	11.4%	6.4%	4.7%
<b>Standard Imaging</b>			
2008	\$97	\$149	0.65
Percent change 2006-2008	37.2%	23.3%	11.3%
2006-2007	24.6%	17.2%	6.3%
2007-2008	10.1%	5.2%	4.7%
<b>CAT/CT/CTA</b>			
2008	\$62	\$502	0.12
Percent change 2006-2008	13.6%	2.5%	10.8%
2006-2007	6.0%	-0.6%	6.6%
2007-2008	7.1%	3.1%	3.9%
<b>MRI/MRA</b>			
2008	\$56	\$1,157	0.05
Percent change 2006-2008	30.1%	-4.1%	35.5%
2006-2007	8.3%	-7.8%	17.4%
2007-2008	20.1%	4.0%	15.5%
<b>Echography/ Ultrasonography</b>			
2008	\$43	\$230	0.19
Percent change 2006-2008	30.5%	20.0%	8.7%
2006-2007	18.2%	12.2%	5.4%
2007-2008	10.4%	7.0%	3.2%
<b>Other Imaging</b>			
2008	\$9	\$306	0.03
Percent change 2006-2008	12.8%	-2.4%	15.5%
2006-2007	2.8%	-8.3%	12.1%
2007-2008	9.7%	6.4%	3.1%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Outpatient facilities include hospitals and other freestanding outpatient facilities. Expenditures exclude facility charges for imaging provided during an inpatient stay; inpatient imaging services are typically included in DRG payments and not billed separately. Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data. Because services are defined at the claims line level, the number of services per member month does not capture changes in the volume of service units included on a single claim. As a result, increases in the average expenditure per service may capture increases in the price per service unit, increases in the number of service units per claim line, or a change in the mix of imaging services provided. The number of services was adjusted for missing data in 2007 and 2008. See the methods appendix for additional details.

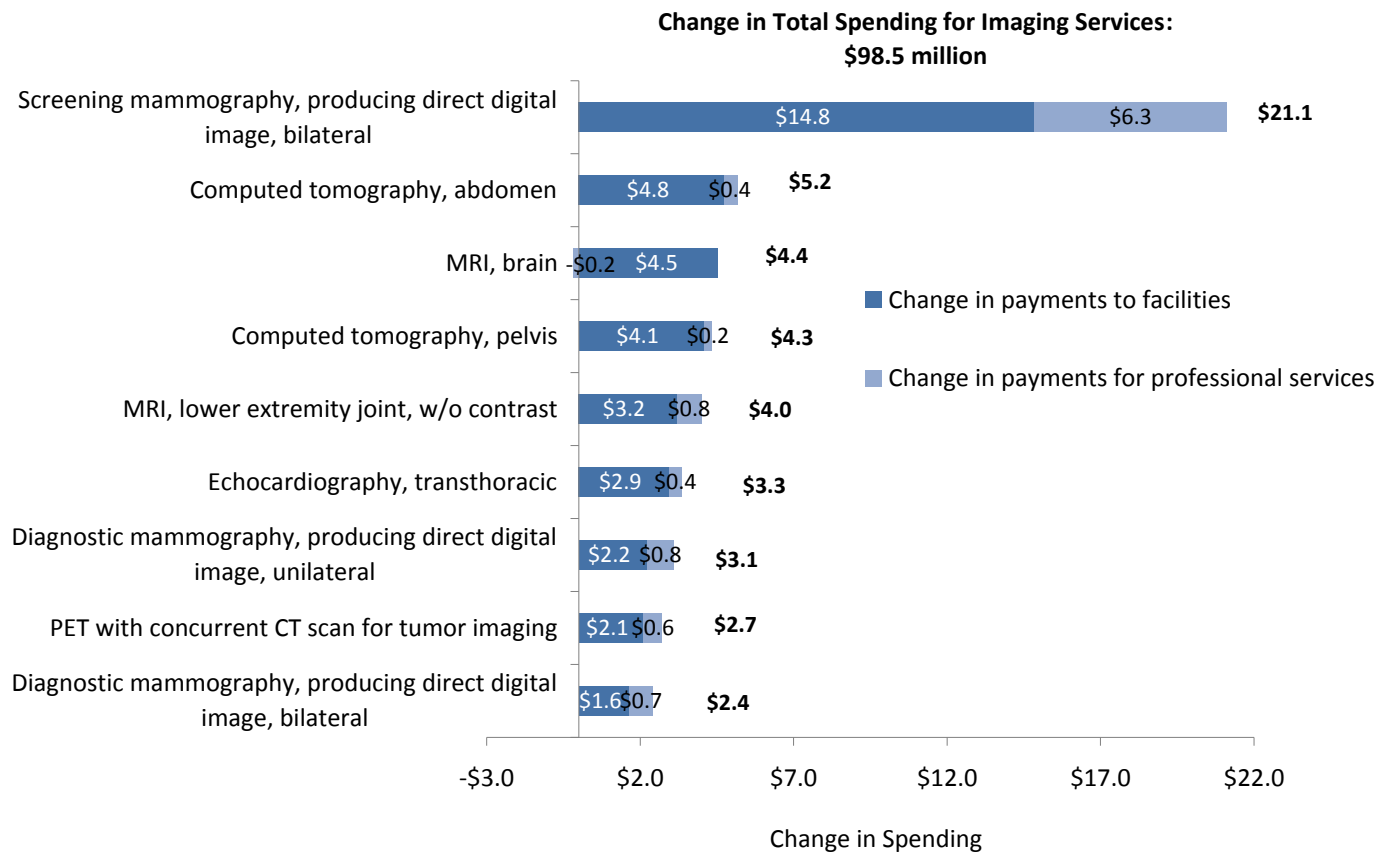
**Table E.3: Components of Change in Spending for Physician and Other Professional per Member Year for Privately Insured Imaging Services by Type of Service, 2006-2008**

	Spending per Member Year	Spending per Service	Number of Services per Member Year
<b>All Imaging</b>			
2008	\$147	\$77	1.90
Percent change 2006-2008	13.2%	5.0%	7.8%
2006-2007	6.5%	2.3%	4.1%
2007-2008	6.3%	2.6%	3.5%
<b>Standard Imaging</b>			
2008	\$48	\$44	1.10
Percent change 2006-2008	8.2%	1.4%	6.7%
2006-2007	2.8%	-0.7%	3.5%
2007-2008	5.2%	2.1%	3.1%
<b>CAT/CT/CTA</b>			
2008	\$23	\$128	0.18
Percent change 2006-2008	13.8%	7.7%	5.7%
2006-2007	10.6%	4.9%	5.4%
2007-2008	2.9%	2.6%	0.3%
<b>MRI/MRA</b>			
2008	\$34	\$307	0.11
Percent change 2006-2008	13.8%	3.3%	10.2%
2006-2007	6.2%	2.5%	3.6%
2007-2008	7.2%	0.8%	6.3%
<b>Echography/ Ultrasonography</b>			
2008	\$38	\$82	0.46
Percent change 2006-2008	18.5%	7.6%	10.2%
2006-2007	9.2%	4.0%	4.9%
2007-2008	8.6%	3.4%	5.0%
<b>Other Imaging</b>			
2008	\$4	\$82	0.05
Percent change 2006-2008	19.6%	4.5%	14.4%
2006-2007	8.6%	1.8%	6.7%
2007-2008	10.1%	2.7%	7.2%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Capitated claims are valued at their fee-for-service equivalents. Estimates include capitated claims but exclude capitation adjustments and other payments that are not captured in the claims data. Because services are defined at the claims line level, the number of services per member month does not capture changes in the volume of service units included on a single claim. As a result, increases in the average expenditure per service may capture increases in the price per service unit, increases in the number of service units per claim line, or a change in the mix of imaging services provided. The number of services was adjusted for missing data in 2007 and 2008. See the methods appendix for details.

**Figure E.5 Selected Services Accounting for Largest Growth in Total Spending for Privately Insured Imaging Services, 2007-2008 (\$ millions)**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include both facility charges for outpatient care and all physician charges where the procedure code indicated an imaging service. Certain claims (representing 20 percent of total imaging expenditures in 2008) are excluded. See the

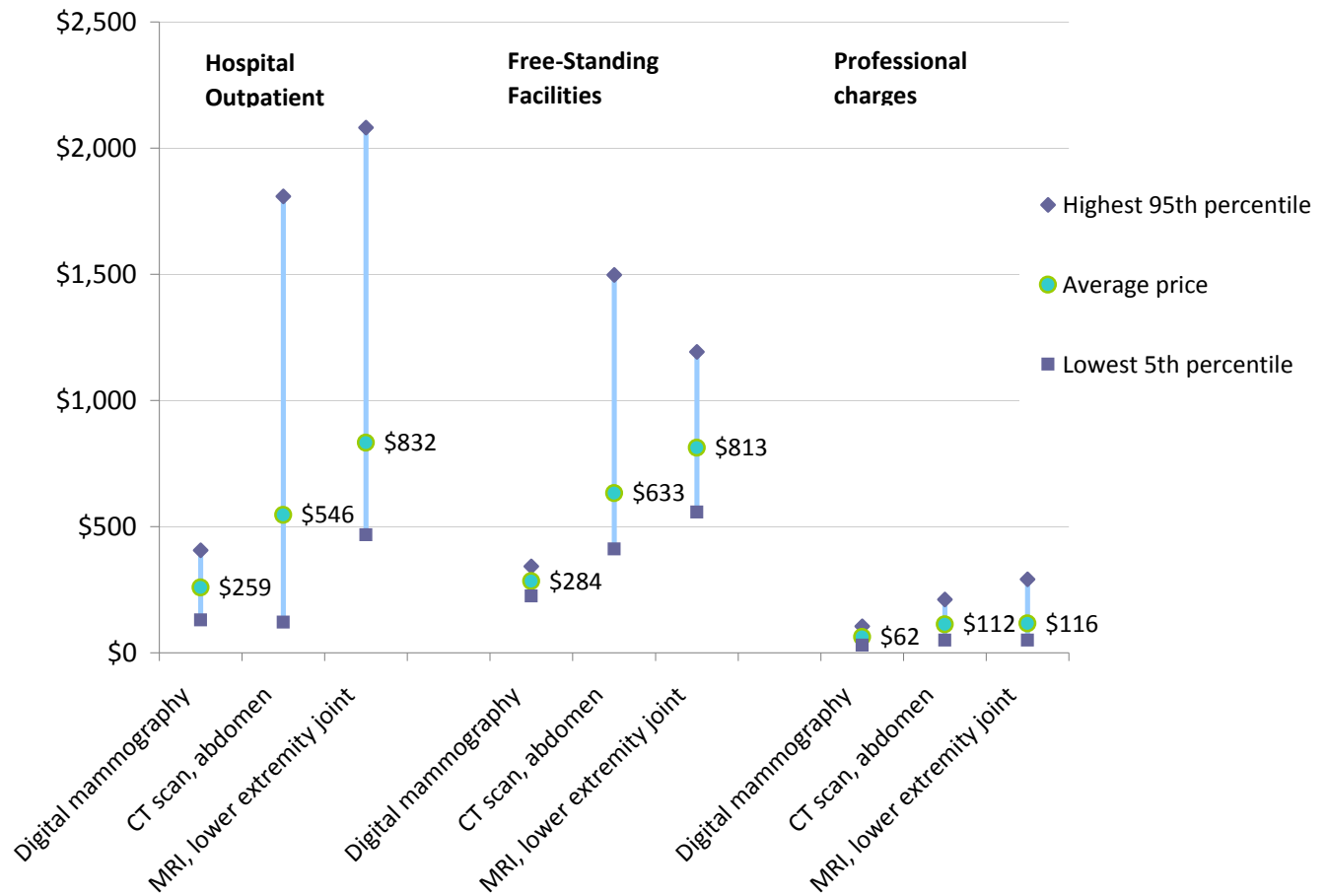
**Table III.E.4. Drivers of Change in Total Expenditures for Privately Insured Imaging Services, 2006-2007**

	Change in Total Expenditures	Change in total expenditures attributable to change in:		
		Price	Number of Service Units	Service Mix
All market basket imaging services (in millions)	\$103.6	\$48.4	\$63.0	-\$7.8
Facility charges	\$79.6	\$33.4	\$55.1	-\$8.9
Professional charges	\$24.1	\$15.0	\$7.9	\$1.2
Percent of total change, all market basket imaging services	100.0%	46.7%	60.8%	-7.5%
Contribution to total change (in percentage points)	12.9%	6.0%	7.9%	-1.0%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Data include both facility charges for outpatient care and all physician charges where the procedure code indicated an imaging service. Data exclude facility charges for imaging provided during an inpatient stay, as inpatient imaging services typically are included in DRG payments and not billed separately. The number of service units on a claim corresponds to the number of times the service or procedure billed for was performed. The change in the number of service units combines change in the number of insured member months, change in number of services pmpm, and change in the number of service units per service. Using service units rather than services as a measure of volume controls for differences in the amount of care billed on a single claim. Certain claims are excluded. See the methods appendix for additional details.

**Figure E.6: Price Variation of Facility Charges for Selected Imaging Services, 2008**



Source: Mathematica Policy Research analysis of claims data for Massachusetts residents, submitted by the six largest private health insurance carriers in Massachusetts.

Notes: Percentiles are calculated and compared by carrier, and only the highest 95th percentile and the lowest 5th percentile are presented, together with average price across all carriers. Digital mammography was identified by CPT code G0202; CT scan of the abdomen by code 74160; and MRI of lower extremity joint by code 73721. Professional charges include only claims with the CPT modifier 26, indicating the charge was only for the professional component of the imaging service.

**Table F.1. Percent of Index Admissions that Resulted in Readmission Within 30 Days, by Medical and Surgical Index Hospitalizations and Index Hospital Teaching Status, 2007**

	Readmissions as a percent of index hospitalizations in:		
	All hospitals	Teaching hospitals	Non-teaching hospitals
All index hospitalizations	6.8%	7.6%	6.1%
Medical	7.8%	9.0%	6.9%
Surgical	5.5%	6.2%	4.7%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents submitted by three private health insurance carriers in Massachusetts.

Notes: Estimates include all-cause readmissions, based on in-state hospitalizations only. Inpatient claims missing date of discharge are excluded. Analyses are not risk-adjusted.

**Table F.2. Spending per Member Year for Readmissions within 30 Days, by Medical and Surgical Index Hospitalizations and Index Hospital Teaching Status, 2007**

	Spending per member year	Percent after index hospitalization in:	
		Teaching hospitals	Non-teaching hospitals
All index hospitalizations	\$49	63.0%	37.0%
Medical	\$32	60.3%	39.7%
Surgical	\$17	68.3%	31.7%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents submitted by three private health insurance carriers in Massachusetts.

Notes: Estimates include all-cause readmissions, based on in-state hospitalizations only. Inpatient claims missing date of discharge are excluded. Analyses are not risk-adjusted.



**Table F.3. Selected Medical and Surgical DRGs with the Highest Readmission Rates, 2007**

Index DRG	Description	Number of index admissions	Number of readmissions	Readmissions as a percent of index admissions	Percent of all index admissions <sup>a</sup>	Percent of all readmissions <sup>b</sup>
<b>Total, top 5 medical and surgical DRGs</b>		5,857	647	11.0%	5.8%	9.4%
<b>Medical</b>						
552	DIGEST SYST DISORD EXCEPT ESOPH,GASTROENT & UNCOMPL ULCERS W	508	75	14.8%	0.9%	1.7%
543	CIRC DISORDERS EXCEPT AMI, ENDOCARDITIS, CHF & ARRHYTHMIA W	469	56	11.9%	0.9%	1.3%
179	INFLAMMATORY BOWEL DISEASE	642	65	10.1%	1.2%	1.5%
127	HEART FAILURE & SHOCK	702	70	10.0%	1.3%	1.6%
541	SIMP PNEUM & OTH RSP DIS X BR,ASTH W MCC	874	86	9.8%	1.6%	2.0%
Total: Top 5 medical DRGs		3,195	352	11.0%	5.8%	8.2%
<b>Surgical</b>						
1	CRANIOTOMY AGE >17 W CC	380	49	12.9%	0.8%	1.9%
550	OTHER VASCULAR PROCEDURES W MAJOR CC	499	64	12.8%	1.1%	2.5%
585	MAJOR STOMACH,ESOPHAGEAL,DUODENAL,SMALL & LARGE BOWEL PROC W	454	55	12.1%	1.0%	2.1%
558	MAJOR MUSCULOSKELETAL PROCEDURES W MCC	361	37	10.2%	0.8%	1.4%
148	MAJOR SMALL & LARGE BOWEL PROCEDURES W CC	968	90	9.3%	2.1%	3.5%
Total: Top 5 surgical DRGs		2,662	295	11.1%	5.8%	11.5%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents submitted by three private health insurance carriers in Massachusetts.

Notes: Estimates include all-cause readmissions, based on in-state hospitalizations only. Inpatient claims missing date of discharge are excluded. Analyses are not risk-adjusted.

<sup>a</sup> Percent of all index admissions for the top 5 medical DRGs is calculated on all medical DRG index admissions. Similarly, percent of all index admissions for top 5 surgical DRGs is calculated on all surgical DRG index admissions, and the sum of the top 5 medical and top 5 surgical DRGs as a percent of all index admissions (last row) is calculated on all medical and surgical DRG index admissions.

<sup>b</sup> Percent of all readmissions for top 5 medical DRGs calculated on all medical DRG readmissions. Similarly, percent of all readmissions for top 5 surgical DRGs calculated on all surgical DRG readmissions, and percent of all readmissions for the sum of the top 5 medical and top 5 surgical (last row) calculated on all medical and surgical DRG readmissions

**Table F.4. Most Frequent Readmission DRGs Associated with the Top 5 Medical and Surgical DRGs, 2007**

Index DRG	Description	Readmission DRG	Description	Percent of Readmissions
<b>Medical</b>				
552	DIGEST SYST DISORD EXCEPT ESOPH,GASTROENT & UNCOMPL ULCERS W	552	DIGEST DIS EX ESOP,GASTR,UNC ULCER W MCC	16.2
		148	MAJOR SMALL & LARGE BOWEL PROC W CC	6.8
543	CIRC DISORDERS EXCEPT AMI, ENDOCARDITIS, CHF & ARRHYTHMIA W	543	CIRC DIS EX AMI,ENDOCARD,CHF,ARRHY W MCC	12.7
		478	OTHER VASCULAR PROCEDURES W CC	5.5
179	INFLAMMATORY BOWEL DISEASE	179	INFLAMMATORY BOWEL DISEASE	46.2
		148	MAJOR SMALL & LARGE BOWEL PROC W CC	9.2
127	HEART FAILURE & SHOCK	127	HEART FAILURE & SHOCK	26.1
		88	CHRONIC OBSTRUCTIVE PULMONARY DISEASE	5.8
		124	CIRC DIS EX AMI W CARD CATH & COMPLX DX	5.8
		316	RENAL FAILURE	5.8
		541	SIMP PNEUM & OTH RSP DIS X BR,ASTH W MCC	5.8
541	SIMP PNEUM & OTH RSP DIS X BR,ASTH W MCC	541	SIMP PNEUM & OTH RSP DIS X BR,ASTH W MCC	10.5
		89	SIMPLE PNEUMONIA,PLEURISY AGE >17 W CC	7.0
<b>Surgical</b>				
1	CRANIOTOMY AGE >17 W CC	1	CRANIOTOMY AGE >17 W CC	16.3
		78	PULMONARY EMBOLISM	8.2
550	OTHER VASCULAR PROCEDURES W MAJOR CC	143	CHEST PAIN	7.8
		127	HEART FAILURE & SHOCK	6.3
585	MAJOR STOMACH, ESOPHAGEAL, DUODENAL, SMALL & LARGE BOWEL PROC W	552	DIGEST DIS EX ESOP,GASTR,UNC ULCER W MCC	10.9
		580	SYSTEM INFEC,PARASIT DIS EX SEPTIC W MCC	10.9
558	MAJOR MUSCULOSKELETAL PROCEDURES W MCC	543	CIRC DIS EX AMI,ENDOCARD,CHF,ARRHY W MCC	5.6
		560	MUSC DIS EX OSTEO,SEP ARTH,CON TIS W MCC	5.6
148	MAJOR SMALL & LARGE BOWEL PROCEDURES W CC	188	OTHER DIGESTIVE SYSTEM DX AGE >17 W CC	7.8
		418	POSTOPERATIVE & POST-TRAUMATIC INFECTION	7.8

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents submitted by three private health insurance carriers in Massachusetts.

Notes: Estimates include all-cause readmissions, based on in-state hospitalizations only. Inpatient claims missing date of discharge are excluded. Analyses are not risk-adjusted.

**Table F.5. Spending per Member Year for Readmissions within 30 Days for Medical and Surgical DRGs with the Highest Readmission Rates, by Hospital Teaching Status, 2007**

	Spending per member year	Percent after index hospitalization in:	
		Teaching hospitals	Non-teaching hospitals
All index hospitalizations (top 5 medical and surgical DRGs)	\$5	71.9%	28.1%
Medical DRGs (top 5)	\$3	72.5%	27.5%
Surgical DRGs (top 5)	\$2	71.0%	29.0%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents submitted by three private health insurance carriers in Massachusetts.

Notes: Estimates include all-cause readmissions, based on in-state hospitalizations only. Inpatient claims missing date of discharge are excluded. Analyses are not risk-adjusted.

**Table F.6. Percent of Index Admissions with a Physician Visit within 30 Days: All Medical and Surgical Index Hospitalizations and Medical and Surgical Index DRGs with the Highest Readmission Rates, by Hospital Teaching Status, 2007**

	Percent after index hospitalization in:		
	All hospitals	Teaching hospitals	Non-teaching hospitals
<b>Medical and Surgical Index Hospitalizations</b>			
Index hospitalizations with at least one readmission			
All medical and surgical index hospitalizations	65.5%	63.7%	67.5%
Top 5 medical and top 5 surgical index DRGs	64.6%	60.6%	70.3%
Index hospitalizations without readmission			
All medical and surgical index hospitalizations	72.8%	72.6%	73.0%
Top 5 medical and top 5 surgical index DRGs	78.6%	78.1%	79.1%
<b>Medical Index Hospitalizations</b>			
Index hospitalizations with at least one readmission			
All medical index hospitalizations	69.8%	67.3%	72.0%
Top 5 medical index DRGs	67.6%	62.5%	73.2%
Index hospitalizations without readmission			
All medical index hospitalizations	79.6%	79.0%	80.0%
Top 5 medical index DRGs	83.3%	82.7%	83.8%
<b>Surgical Index Hospitalizations</b>			
Index hospitalizations with at least one readmission			
All surgical index hospitalizations	58.4%	59.0%	57.4%
Top 5 surgical index DRGs	61.0%	58.9%	65.3%
Index hospitalizations without readmission			
All surgical index hospitalizations	64.8%	66.9%	62.4%
Top 5 surgical index DRGs	73.0%	73.9%	71.6%

Source: Mathematica Policy Research analysis of claims data for Massachusetts residents submitted by three private health insurance carriers in Massachusetts.

Notes: Estimates include all-cause readmissions, based on in-state hospitalizations only. Inpatient claims missing date of discharge are excluded. Analyses are not risk-adjusted.

## **Technical Appendix**

- A. Data Collection
- B. Data Cleaning
- C. Measures of Expenditure and Utilization
- D. Analysis of Expenditures and Utilization
- E. Decomposition and Price Variation
- F. Hospital Efficiency Analysis

## A. Data Collection

### Claims data

We requested each carrier submit files containing all pharmacy and medical claims with an incurred date between January 1, 2006 and December 31, 2008 for all of their enrollees with comprehensive medical benefits who were Massachusetts residents. The claims request covered all comprehensive private medical insurance products,<sup>1</sup> and included only enrollees who were Massachusetts residents covered by a Massachusetts policy. Each carrier provided claims for four service types: pharmacy, inpatient hospital, outpatient hospital, and all other medical.

Ten carriers provided data in sufficient time to include in the analysis. Of these, four carriers were dropped from the analysis for the following reasons:

- Two carriers were unable to provide data on the number of members enrolled each year by market segment, so that expenditure trends per member per month could not be calculated.
- One carrier provided files by paid date (not incurred date), omitting many claims that were incurred in the last months of 2008.
- One carrier was unable to identify the location of service (e.g., acute inpatient hospital, hospital outpatient) for hospital claims.

The remaining six carriers (Blue Cross Blue Shield, Fallon, Harvard Pilgrim Health Care, Neighborhood Health Plan, Tufts, and United), represented 91 percent of all self- and fully-insured lives reported by Massachusetts carriers in 2008.<sup>2</sup>

### Other payments for health care

The carriers also reported payments to providers that did not flow through their claims systems. These were reported in two major categories: capitation payments that correspond to encounter claims, and other payments (such as pay-for-performance withholds and bonuses) that do not correspond directly to service use.

All six of the carriers believed that their claims data included most or all encounters under capitation arrangements. Each carrier flagged these claims as capitated encounters and imputed an allowed amount equal to the fee-for-service (FFS) equivalent. These FFS equivalents assigned were used to estimate the cost of services by service and/or provider type. A capitation adjustment was calculated equal to the total capitation amounts that the carriers reported minus the sum of the fee-for-service equivalents for encounters incurred the same calendar year. The capitation adjustment is reported in the overview section, but could not be allocated meaningfully to single types of service (e.g., inpatient admissions). As a result, total and pmpm expenditures in the latter sections of this report may slightly underestimate the true cost of services.

Other payments not flowing through the claims system also are reported in the overview section. Like the capitation adjustment, these payments cannot be assigned to specific services or

beneficiaries and are not included in the more detailed estimates (by type of service or insurance market segment) reported in this report.

## B. Data Cleaning

Extensive data checks were performed to identify potential errors in reporting. These checks led to several carriers resubmitting new data files as well as programming adjustments to accommodate differences in how carriers' populated the data fields. We then contacted every carrier, provided key estimates from the data each had submitted, and confirmed that our estimates matched the carrier's own estimates.

To standardize claims by type of service, we referenced the provider type and location of service reported on each claim as shown in Technical Appendix Table 1. All claims were included in the overview of expenditures and utilization—including those that could not be assigned to the standardized inpatient, outpatient, or professional services categories. Thus, the overview estimates include not only inpatient, outpatient, and professional services, but also prescription drugs, skilled nursing and other non-acute institutional care, and "all other" services such as laboratory services, home health care, ambulance services, durable medical equipment, and other nonhospital services.

**Appendix Table 1**  
**Construction of Standardized Types of Service**

Standardized Type of Service	Carrier Data File	Reported Type of Provider	Reported Location of Service
Inpatient (Chapter 3.B)	Inpatient	Hospital	Inpatient hospital
Outpatient hospital (Chapter 3.C)	Outpatient	Hospital	Any <sup>3</sup>
Free-standing outpatient (Chapter 3.C)	Outpatient, Other medical	Not hospital, not physician or other professional	Urgent care facility, ambulatory surgical center, birthing center, independent clinic, or comprehensive outpatient rehabilitation facility
Professional services (Chapter 3.D)	All files	Physician or other professional	Any

Finally, different payment methods affected some carriers' ability to provide all of the requested data elements. Whenever possible, claims data with minor problems were retained in the analysis and dropped only from rows or columns on tables where the specific data problem prevented including them. This occurred in the following tables.

- One carrier's inpatient claims records did not include a discharge date. As a result, they were omitted from the calculations of average length-of-stay for hospital admissions and from the hospital readmissions analysis.
- Two carriers did not use a consistent DRG grouper across providers and/or across years. Their claims were dropped from the decomposition analysis of changes in inpatient hospital expenditures (see Technical Appendix Section D).

## C. Measure of Expenditure and Utilization

### Measuring expenditures

The expenditures captured in this report represent payments received by providers from carriers, patients, and any third-party payers (such as Medicare). Expenditures were measured as the sum of all allowed amounts, which reflect negotiated prices for each carrier and service provider. Both negative and positive allowed amounts were included, so that all expenditure amounts reflect corrected claim lines. In many cases, the allowed amount exceeded the carrier's paid amount, due to enrollee cost-sharing and third-party payments.

### Measuring utilization

The carriers provided claims data at the claim-line level. For all service types except inpatient hospitalizations, service use was measured at the claim-line level when the claim line contained both a service code (CPT or HCPC) and a non-negative allowed amount.

Considering only claim lines with non-negative allowed amounts, however, introduced the potential for double counting services. Due to the difficulty of matching records (carriers were not asked to report a claim ID, and generally did not), we were unable to match records with a negative allowed amount to the record it corrected. This introduced a trivial level of error in the utilization estimates: just 0.10 percent of outpatient claims had a negative allowed amount for which there may have been an offsetting claim (with a non-negative allowed amount); 0.07 percent of professional services claims had a negative allowed amount.

A BETOS grouper was used to aggregate services by service type, including:

- Evaluation and management
- Imaging
  - Standard imaging (e.g., x-rays)
  - MRIs
  - CAT/CT/CTA scans



- Echography/ultrasonography
- Other imaging
- Procedures (e.g., major cardiovascular procedures, procedures related to pregnancy and childbirth, oncology-related procedures, and ambulatory and other minor procedures)
- Other miscellaneous procedures and services (including lab tests and chemotherapy)

The unit of measurement for inpatient hospital care was a hospital admission. The line-item detail for each hospital stay was rolled up to the admission, using admission and discharge dates to sum claim lines as necessary. Admissions were classified into medical, surgical, and maternity or newborn care using the diagnosis-related group (DRG) on each claim.

In cases where the facility and physician submitted separate claims for the same outpatient visit or hospital admission, service use is counted in both the facilities sections (Sections B or C) and in the professional services section (Section D) of this report.

## **Expenditures and utilization incurred but not reported**

The claims for services other than prescription drugs reflected a nontrivial level of expense that was incurred but not reported (IBNR) as of March 2009. Therefore, to understand expenditure levels and trends, it was necessary to estimate completion factors for each service type.

Using a proprietary actuarial model, Oliver Wyman estimated expenditure completion factors by calendar year for 32 service types and subcategories as needed to support the estimates in Chapter 3. Oliver Wyman's model considers claims by incurred and paid month, and uses a conventional "chain ladder" analysis to estimate IBNR expenditures by incurred month. Actuarial judgment was used to adjust the initial estimates for outlier payments to avoid skewing estimates of future claims. The monthly IBNR estimates were used to develop completion factors that were applied to each calendar year of reported claims to estimate the total incurred expenditures by calendar year for 32 service types and subcategories.

Finally, it was necessary to estimate analogous completion factors for measures of utilization (hospital admissions, inpatient days, and outpatient and professional service use). We assumed that 2006 claims were effectively complete (consistent with Oliver Wyman's modeling results) and estimated completion factors for 2007 and 2008. Completion factors for 2007 were estimated as the percentage of services, admissions, or days incurred in 2006 that were reported by March 2008 (a 15 month run-out). Completion factors for 2008 were estimated as the percentage of claims incurred in 2006 that were reported by March 2007 (a 3-month run-out).

## **D. Analysis of Expenditures and Utilization**

### **Inpatient hospital**

Expenditures and utilization (admissions) were tabulated for each carrier by year, insurance market segment, and grouped DRG (medical, surgical, maternity and newborn care, or unknown).<sup>4</sup> All hospitalizations with a missing DRG (including hospitalizations for carriers that did not use DRGs) were categorized as unknown. Hospitals were classified as teaching or nonteaching by matching the provider names and/or ID to a list provided by the Division, supplemented with extensive web searches on the provider name.

### **Outpatient**

Expenditures and utilization were tabulated for each carrier by year, insurance market segment, and service type. For outpatient hospital services, expenditures and utilization were tabulated by hospital type (teaching or nonteaching) and location (Boston or all other areas).

### **Professional services**

Expenditures and utilization were tabulated for each carrier by year, insurance market segment, provider type, and service type. Physicians in general practice, family practice, internal medicine, obstetrics and gynecology, pediatrics, geriatric medicine, preventive medicine, public health and general preventive medicine, and adolescent medicine (as indicated in the provider type field) were flagged as primary care physicians, as were nurse practitioners. All other physicians were classified as specialists, and other non-physician professionals (e.g., nurses, chiropractors, therapists, social workers) were classified as “other providers.” Unknown provider type included physician providers identified as a “medical group practice.”

### **Imaging**

Imaging services include both a facilities component (charged by the facility or, in some cases, by the physician for use of radiological equipment) and a professional component (charged by the physician and other professionals who conduct or interpret the imaging). The analyses of outpatient and professional services include, respectively, payments to facilities and payments to physicians for imaging services.<sup>5</sup> However, the discussion of imaging services includes hospital outpatient and free-standing facility charges for imaging services, as well as professional charges across all locations of service (including inpatient, outpatient, offices and clinics, and labs). Facility charges for imaging services provided during an inpatient hospital stay are not separable from the DRG payment for the hospital stay and, therefore, are not included.

## **E. Decomposition and Price Variation Analysis**

This section describes the method for decomposing changes in total expenditures into the amounts attributable to changes in the average price per service, the number of services provided, and the mix of services delivered. Changes in medical expenditures were analyzed separately for (1) inpatient hospital, (2) outpatient hospital, (3) free-standing outpatient facilities, and (4) physician and professional services.<sup>6</sup>

### **Service market baskets**

Decomposing total expenditures entailed defining a consistent market basket of services that could be compared from year to year. In turn, to develop a market basket of services required some parsing of the claims data. First, claims with outlier values for the allowed amount were discarded,<sup>7</sup> as were all claims flagged as capitated or claims with missing or zero values for allowed amount, DRG or service code, or service units. To decompose inpatient spending separately for teaching and nonteaching hospitals, it was necessary to exclude claims for admissions to out-of-state hospitals or to hospitals where teaching status was unknown.

Second, to eliminate distortion that differences in IBNR would introduce, claims paid more than a certain number of months after the end of the year in which they were incurred were excluded. The decomposition of expenditure change between 2006 and 2007 used a 15-month run out (claims incurred in 2006 and paid by March 2008, and claims incurred in 2007 and paid by March 2009). The decomposition of expenditure change between 2007 and 2008 used a 3-month run out (claims incurred in 2007 and paid by March 2008, and claims incurred in 2008 and paid by March 2009).

For each service type of interest (inpatient hospital, outpatient hospital, free-standing outpatient facilities, and physician and professional services), a market basket of services in each category was defined as the services provided consistently in each comparison year. These services were then weighted by their utilization, averaged across all carriers and between comparison years.

While most services within a type of service are included in a market basket, some services did not occur in every year and, therefore, were omitted from the decomposition analyses. The decomposition included 71 percent of the total change in expenditures between 2006 and 2008 (Technical Appendix Table 2).

**Appendix Table 2**  
**Change in Expenditures for Market Basket Services as a Percent of**  
**Total Expenditure Change, 2006-2008**

	Change in expenditures for services in the analysis (millions)	Change in expenditures for services in the market basket (millions)	Market basket change as a percent of total change
All services	\$1,590	\$1,134	71.3%
Physician	\$671.2	\$496.4	74.0%
Outpatient hospital	\$637.1	\$472.8	74.2%
Inpatient	\$323.2	\$181.4	56.1%
Teaching	\$201.6	\$108.8	54.0%
Non-teaching	\$105.3	\$72.6	68.9%
Out-of-state	\$16.3	na	na
Free-standing outpatient	-\$41.6	-\$16.9	40.7%

Note: Decomposition analyses were not performed for pharmacy services, non-acute institutional services, and other non-hospital services.

## Decomposition calculations

For each service type, the change in expenditures for market-basket services from 2006 to 2007 and from 2007 to 2008 was decomposed into three components:

1. Additional expenditure due to changes in price. This amount was calculated as the change in total expenditures for the market basket, holding the number and type of services received constant.
2. Additional expenditure due to a change in the number of services delivered. This amount was calculated as the change in total expenditures for services in the market basket holding the price for each service and the mix of services constant, but allowing the quantity of each service (or admission type) to increase by the same percentage as the aggregate number of services (or admissions) increased during the year.
3. Additional expenditure due to a change in the service mix. This amount was calculated as the change in total expenditures for services in the market basket holding the price for each service and the total number of services constant, but allowing the distribution of services to change to reflect actual usage patterns in the end year.

The decomposition allocates the additional spending for each service or admission in each year as follows. Let  $S$  represent the number of different services (or hospital admissions) in a market basket. In period 1, each service is performed  $N^1$  times, and the average price for that service across all

providers is  $P^1$ . Similarly, in period 2, each service is performed  $N^2$  times, and the average price for that service across all providers is  $P^2$ :

Using this notation, the total change in cost is:

$$\begin{aligned}
 & \sum_{i=1}^S [(N_i^2 * P_i^2)] - \sum_{i=1}^S (N_i^1 * P_i^1) \\
 & \sum_{i=1}^S [(N_i^2 * P_i^2)] - \sum_{i=1}^S [(N_i^2 * P_i^1)] + \sum_{i=1}^S [(N_i^2 * P_i^1)] - \sum_{i=1}^S [(N_i^1 * P_i^2)] + \sum_{i=1}^S [(N_i^1 * P_i^2)] - \sum_{i=1}^S (N_i^1 * P_i^1) \\
 & \sum_{i=1}^S [(P_i^2] - P_i^1) * \frac{1}{2} * (N_i^{12} + N_i^2) + \sum_{i=1}^S [(N_i^2 - N_i^1) * \frac{1}{2} * (P_i^1 + P_i^2)] \\
 & \sum_{i=1}^S [(P_i^2] - P_i^1) * \frac{1}{2} * (N_i^1 + N_i^2) \quad \text{(The amount attributable to change in price)} \\
 & + \sum_{i=1}^S \left( N_i^2 - N_i^1 * \frac{\sum_{i=1}^S N_i^2}{\sum_{i=1}^S N_i^1} \right) * \frac{1}{2} * (P_i^1 + P_i^2) \quad \text{(The amount attributable to change in service mix)} \\
 & + \sum_{i=1}^S \left( N_i^1 * \frac{\sum_{i=1}^S N_i^2}{\sum_{i=1}^S N_i^1} - N_i^1 \right) * \frac{1}{2} * (P_i^1 + P_i^2) \quad \text{(The amount attributable to change in number of services)}
 \end{aligned}$$

Details of the calculations for each category of services are described below.

**Inpatient hospital services.** The unit of analysis was an inpatient stay for a specific DRG. The market basket for inpatient services included all hospitalizations associated with a DRG that occurred in at least once in the years being compared (2006 and 2007 or 2007 and 2008). For each carrier, the number of admissions was calculated as the total number of inpatient stays for that DRG. Price was calculated as the average price across all hospitals for inpatient stays associated with that DRG.

Because most carriers used a different DRG grouper or different version of the same DRG grouper to classify admissions, the change in expenditures for inpatient services was calculated separately for each carrier. Two carriers that did not consistently classify inpatient stays using the same DRG grouper across all three years were excluded from the decomposition analysis.

**Outpatient services.** The unit of analysis was a service, identified by service code. The market basket included service codes corresponding to at least one claim in both comparison years. Services associated with codes that were discontinued or newly introduced between 2006 and 2008 were not included in the market basket.

Outpatient facility claims and professional claims were decomposed separately, and a single service may be counted in the outpatient decomposition and again in the professional services decomposition, if the outpatient facility and the physician billed separately. The number of services was calculated as the sum of the service units on all claims with the given service code.<sup>8</sup> The

average price was calculated as the mean price paid by all carriers to all providers for a single unit of service associated with a service code.

**Physician or professional services.** The unit of analysis was a service, identified by a service code and modifier.<sup>9</sup> The average price for a service can differ substantially when a physician provides only the professional component, versus both the professional and facility components. The service code modifier was used to separate these services when billed under the same service code. All other aspects of the physician or professional services decomposition follow the outpatient services decomposition.

**Imaging services.** The unit of analysis and definition of average price and number of services are analogous to those used in the outpatient and professional services decomposition. The analysis considered (separately) use of outpatient hospital facilities, use of free-standing outpatient facilities, and professional charges. Inpatient facility charges for imaging services were not included, as these charges cannot be parsed from DRG payments for hospital stay.

Finally, all claims included in the decomposition analysis were sorted to identify:

- The types of admission or type of services that represent the largest expenditure for each of the service types (inpatient, outpatient, physician/professional, and radiological services); and
- The types of admissions or individual services for each service type for which total expenditures increased the most year-over-year.

## Price variation analysis

The price paid for an inpatient admission or service varies by carrier and, for each carrier, by provider. To analyze the variation in prices paid by carriers for similar services, claims corresponding to service codes or DRGs that accounted for a large proportion of total utilization in each service type were selected. Those claims were sorted to calculate the mean, 5th percentile, and 95th percentile price paid by each carrier.<sup>10</sup> Descriptive statistics showing the distribution of prices for each unit of service (by DRG or service code) across all carriers and all providers were calculated as the minimum 5th percentile price among all carriers, the maximum 95th percentile price among all carriers, and the mean of the carriers' average prices weighted by number of admissions or number of services.

## F. Hospital Efficiency Analysis

The hospital efficiency analysis is based on inpatient claims from the three carriers that identified the date of hospital discharge and also used AP-DRGs in 2007.<sup>11</sup> The analysis included only in-state hospitalizations with either medical or surgical DRGs. Maternity DRGs and hospitalizations missing DRG data were excluded.

## Identifying index hospitalizations, readmissions and physician visits

We classified all hospitalizations as either index admissions or readmissions. An index admission was any admission without a prior admission within 30 days. A readmission was any admission (to any in-state hospital, for any reason) within 30 days after discharge. Each admission was categorized as either an index admission or a readmission, but not both. This definition is consistent with recent studies of readmissions among Medicare populations.<sup>12</sup>

A readmission rate is defined as any readmission within 30 days of discharge after an index admission. This definition does not separately count multiple readmissions. However, expenditures for readmissions include all readmissions.

Physician visits are identified within 30 days of discharge or between discharge and first readmission, whichever came first. Physician visits included claims for a primary care provider or physician specialist in any non-inpatient setting.<sup>13</sup>

To identify the five medical and the five surgical DRGs with the highest rates of readmission, we first identified the 30 most frequently coded medical and surgical DRGs in the claims data to preclude selecting low-frequency DRGs, regardless of the rate of readmission. The DRGs with the highest readmission rates then were selected from among the 30 most frequent medical and surgical DRGs.

## Limitations of the efficiency analysis

The scope of the readmissions analysis was constrained by both the time and resources available for this study. Specifically, we did not pursue a number of refinements that might affect interpretation of the results or their usefulness to clinicians and policymakers. For example, we did not adjust readmission rates for differences in patient acuity. Such adjustments might affect differences in rates of readmission to teaching versus nonteaching hospitals. Adjusting for acuity could also affect the systematic difference in the patient's probability of having seen a physician following discharge: if teaching hospitals treat more acute patients who (all else equal) are more likely to be readmitted early, such patients would systematically have less opportunity to see a physician between discharge and readmission.

In addition, some readmissions may be unrelated to the index admission, and some may not be avoidable. We did not attempt to distinguish either related or avoidable readmissions from overall readmissions, nor did we attempt to group DRGs into clinically relevant categories (e.g., all DRGs related to pneumonia). Understanding rates of avoidable readmission and readmissions in clinically relevant categories could be helpful to clinicians and policymakers in developing strategies to improve the efficiency of hospital care in Massachusetts.



## Endnotes for Technical Appendix

<sup>1</sup> Enrollees in Medicare, Medicaid, the Federal Employee Health Benefit Plan (FEHBP), and Commonwealth Care were not included.

<sup>2</sup> Massachusetts Division of Health Care Finance and Policy, unpublished data.

<sup>3</sup> While we did not restrict the outpatient hospital analysis to a specific location of service, the vast majority of outpatient claims indicated outpatient hospital or emergency room as the location of service. Any claim that a carrier submitted in its outpatient data file with a provider type of “hospital” and a different location of service was checked to confirm that it was for an outpatient hospital service. In most cases, such claims indicated a specific location of service within a hospital such as “radiology” or “laboratory”.

<sup>4</sup> Maternity and newborn care included all admissions related to pregnancy, delivery, and newborn care (CMS Major Diagnostic Categories 14 and 15).

<sup>5</sup> In some cases, physicians billed for both the facility and professional components of an imaging service. When this occurred, the expenditures and utilization associated with the claim were included in the physician category.

<sup>6</sup> These four categories are defined to be mutually exclusive, so that the change in expenditures for each category sums to the change in total medical expenditures (except for a small number of services not included in the market basket). The decomposition for inpatient and outpatient hospital and free-standing outpatient facilities includes only expenditures related to use of facilities. All expenditures for physician services, regardless of the location of service (inpatient, outpatient, ambulatory surgery center, or office-based) are included in physician and other professional services. A single episode of care from a patient’s perspective—for instance, a visit to the emergency room—may result in more than one claim from different providers, and would be counted in each relevant category.

<sup>7</sup> The algorithm for identifying outlier values is as follows. For each carrier, start at the 90th percentile of the price distribution for each DRG or procedure code and search upward through each percentile until the upper bound is set or the maximum price is reached. The upper bound is set as  $1.2 * P_i$  if the ratio of  $P_i$  to  $P_{i+1}$  is greater than 1.5. Discard all claims with prices above the upper bound.

<sup>8</sup> For the decomposition analysis, the number of services was measured as a service unit (versus a claim) in order to track changes in price more accurately. When the number of service units reported on a claim was greater than one, the price for each unit was set equal to the total allowed amount divided by the number of service units.

<sup>9</sup> Professionals may bill for the professional component only (modifier 26), the technical component only (modifier TC), or for both components (no modifier or modifiers other than 26 and TC).

<sup>10</sup> Selecting the 5th and 95th percentile prices is intended to eliminate outlier payments. The 5th and 95th percentile prices show much less variation than the minimum and maximum prices paid by each carrier.

<sup>11</sup> Two of these carriers used version 21; the other used version 14.

<sup>12</sup> For example, see: Krumholz et al. Patterns of Hospital Performance in Acute Myocardial Infarction and Heart Failure 30-Day Mortality and Readmission. *Circ Cardiovasc Qual Outcomes* 2009; 2: 1-7.

<sup>13</sup> Primary care physicians included general practice, family practice, internal medicine, obstetrics and gynecology, pediatrics, geriatric medicine, preventive medicine, public health & general preventive medicine, and adolescent medicine. All other physicians were classified as specialists. We limited to the non-inpatient setting to ensure that the visit occurred post-discharge and, if relevant, before readmission.



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